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**PREDESIGN INVESTIGATION RESULTS
LANDFILL GAS AND LEACHATE
COMPONENTS**

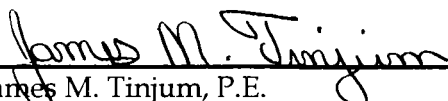
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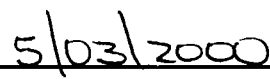
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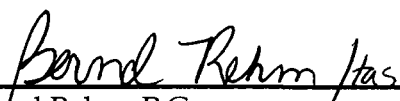
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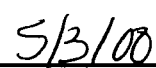
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RMT, INC.**

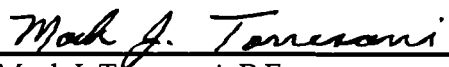
May 2000


James M. Tinjum, P.E.
On-site Coordinator


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Project Manager



Date

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Section 1

Introduction

In accordance with the approved Predesign Investigation and Remedial Design/Remedial Action Workplan (RMT, 1999), Predesign Investigations (PDI) were conducted to obtain additional information necessary for initiating the Remedial Design (RD) at the H.O.D. Landfill site in Antioch, Illinois. As part of the PDI, a landfill gas (LFG) and leachate collection field investigation was conducted.

1.1 Background and Scope of the Landfill Gas Investigation

The Statement of Work (SOW) requires the installation of an active landfill gas (LFG) system at the facility, or an upgrade of the existing passive gas system, or some combination of the two. The objective of an LFG management system is to prevent off-site gas migration and to limit the build-up of LFG within the waste mass. The RD will propose to collect and treat the LFG in a controlled manner, and to control the migration of LFG.

Landfill gas sampling was performed to assess the design parameters for implementing an active gas management system and parameters to meet air permit requirements. This study was conducted to determine the viability of incorporating existing extraction points into an active gas extraction system and to identify new extraction points, if any, which may be needed to implement an active gas management system. This study will be used to evaluate the requirements of an LFG system that is sufficient to control the LFG at the site.

1.1.1 Physical Inspection

The condition of the existing 14 gas well flares (GWF1 to GWF14), the existing 14 leachate piezometers (LP1 to LP14), and the leachate extraction points (P1, P2A, P3A, P8, P9, and P10) were assessed to determine if they could be utilized as part of a gas management system to be implemented during the RA. The locations of the wells that were physically inspected are shown on Figure 1. The inspections of each gas well, leachate piezometer, leachate extraction point, and final cover consisted of the following:

- Inspection of the condition of aboveground well and flare components (condition of well pipe, vertical orientation, condition of flares)
- Evaluation of well data (stick-up height, total depth, liquid depth)
- Inspection of the landfill cap for indications of gas migration, such as stressed vegetation, odors, and (if the cover is saturated) gas bubbles emanating from the cover soil.

PHOTOGRAPHIC: MARCH 4, 1999.

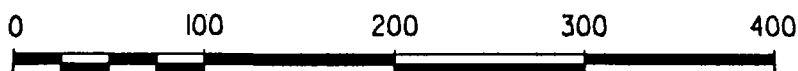
3. THE FACILITY BOUNDARY WAS INTERPRETED BY R.E. ALLEN AND ASSOCIATES, LTD.
4. VERTICAL DATUM IS REFERENCED TO NATIONAL GEODETIC VERTICAL DATUM (NGVD) OF 1929.
5. LEACHATE LEVELS WERE RECORDED ON NOVEMBER 8 AND 9, 1999 BY RMT, INC.
6. THE AVERAGE SHALLOW WATER LEVELS RECORDED FOR THE EXTERIOR MONITORING WELLS DURING THE DECEMBER, 1999, GROUNDWATER PDI ARE INDICATED IN PARENTHESIS NEXT TO THE WELLS MONITORED.

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SCALE: 1" = 100'

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NO.	BY	DATE	REVISION	APP'D.
PROJECT: WASTE MANAGEMENT OF ILLINOIS, INC. H.O.D. LANDFILL PREDESIGN INVESTIGATION				
SHEET TITLE: LEACHATE LEVELS FOR NOVEMBER 1999				
DRAWN BY: LLS		SCALE: 1"=100'		PROJ. NO. 5314.04
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<div style="display: flex; justify-content: space-between; align-items: center;"> <div>  </div> <div>  </div> <div> <p>744 Heartland Trail Madison, WI 53717-1934</p> <p>P.O. Box 8923 Madison, WI 53708-8923 Phone: 608-831-4444</p> </div> </div>				

WASTE MANAGEMENT



The information collected was used to determine which wells and probes are suitable for incorporation into an active gas collection system, as described in Section 3 of this report.

1.1.2 Gas Analysis

Landfill gas is composed of two major gas constituents, methane (CH₄) and carbon dioxide (CO₂). These gas constituents, along with oxygen (O₂) and balance gas (primarily nitrogen), were analyzed in the field during the pilot investigation using a portable gas analyzer.

1.2 Background and Scope of the Leachate System Investigation

The SOW requires that a pilot/predesign study be conducted to determine the viability of using the existing extraction points for the withdrawal of leachate from the site. The existing extraction points are to be considered for use in a dual landfill gas and leachate extraction system to be implemented as part of the RA. According to the SOW, the purposes of the leachate extraction system are as follows:

1. To increase leachate collection efficiencies
2. To reduce leachate levels throughout the landfill to eliminate seeps
3. To induce an inward gradient to control and collect shallow groundwater in the surficial sand aquifer in the vicinity of the site

A WMII pumping test conducted at MHE prior to the RI indicated that leachate pumping rates of 30 gpm to 40 gpm could not be sustained for extended periods once liquid volumes contained in the system storage (i.e., manhole, lateral piping, gravel bedding) had been removed. After removing the leachate from storage, the manhole went dry and recharged at a slow rate.

Based on information from the RI (Montgomery Watson, 1997), the leachate piezometers were constructed using a washed pea gravel filter pack around 6-inch-inner-diameter (ID) Schedule 80 PVC 0.020-inch slotted screen, with hydrated bentonite filling the annular space above the filter pack around the 6-inch PVC riser pipe (Montgomery Watson, 1997). Locking protective casings were installed over the riser pipes. The wells were screened from approximately 0 to 5 feet above the base of the landfill to approximately 0.5 to 4.6 feet below the base of the landfill cap. This construction method was chosen so that the wells could be used for extraction of leachate and landfill gas from the site.

This field investigation was performed to assess the condition of the existing leachate collection system in place at the site and to assess the viability of using existing extraction points for the

withdrawal of leachate from the site. This investigation also provides data necessary for the design of an automated system to further reduce leachate levels throughout the landfill and establish an inward gradient condition within the site. In Section 3 of this report, the viability of using existing extraction points is assessed, and any new extraction points needed to develop such a system are identified. The viability of operating this system in conjunction with the LFG collection and treatment system is also evaluated in this report.

The field investigation of the existing leachate extraction system was similar to the investigation of the LFG system with the following additions:

- Inspection of the condition of the existing leachate extraction equipment, including pumps, gauges, electrical lines, supporting pipelines, manholes, and collection lines.
- Inspection of the downhole condition. A section of PVC pipe (equivalently sized to leachate pumps expected to be utilized for the RA) was lowered to check for kinks, well casing breaks, or other obstructions that would render the well unusable for gas extraction.

Information collected during the inspection of existing extraction points and the existing leachate collection system is utilized to determine which components are suitable for incorporation into an automated leachate extraction system to be implemented as part of the RA.

Section 2

Landfill Gas Investigation

2.1 Physical Evaluation of Existing Well Locations

2.1.1 Condition of Aboveground Well and Flare Components

Prior to the field PDI, the aboveground portions of the 14 gas well flares were dismantled by WMII to allow for collection of well data by RMT field personnel. Dismantling was achieved either by removing the flare component at the flange connecting the PVC riser to the flare stem, or by cutting the PVC riser near the flange. The vertical orientation of the flares was not fully assessed (i.e., only the PVC riser could be observed for vertical orientation). The gas well PVC risers were temporarily sealed following removal of the flare units.

Observation of the condition of the flares was conducted as these components were lying on the ground in proximity to the well locations. The gas well flares were generally in poor condition with the flare stems slightly rusted/corroded and the wind screens heavily rusted/anodized and often cracked.

The PVC riser pipe was generally in good condition. Often, the pipe was stained orangish/red. This was most likely rust staining from the steel flare units mounted on the PVC risers. The PVC risers for GWF 1 through GWF 14 were generally near vertical, with the exception of GWF 6, which was tilted approximately 10 degrees. Full descriptions of the gas well flare's condition are contained in the field notebook (Appendix A). In addition, photographs of representative well locations are contained in Appendix B.

2.1.2 Well Data

Field measurements were made of the 14 existing gas well flares (GWF 1-14), the existing 14 leachate piezometers (LP1-14), and the leachate extraction points (P1, P2A, P3A, P8, P9, and P10), including stick-up height, total depth, and liquid depth. This information is given in Tables 1 and 2. Full details on the construction of these wells (including the as-constructed screen interval) are included in Appendix C of this report.

Table 1
Landfill Gas and Leachate Measurements in the New⁽¹⁾ Landfill
H.O.D. Landfill

LOCATION	% CH ₄	% O ₂	% CO ₂	% BALANCE GAS	CALCULATED % LEL ⁽²⁾	GROUND SURFACE EL ⁽³⁾ (ft A.M.S.L.)	MEASURED STICKUP ⁽⁴⁾ (ft)	WELL DEPTH (ft BGS) ⁽⁵⁾	MEASURED BOTTOM OF WELL EL (ft A.M.S.L.)	LEACHATE LEVEL (ft BGS) ⁽⁵⁾	APPROXIMATE LEACHATE EL (ft A.M.S.L.)	WELL DIAMETER (in)
GWF1	64	0.1	32.7	3.1	100+	795.1	1.5	40.5	754.6	31.9	763.2	8
GWF2	64	0.3	32.9	3	100+	795.5	1.6	46.4	749.1	29.2	766.3	8
GWF3	62.5	0.2	32.9	4.1	100+	794.1	3.0	41.0	753.1	36.1	758.0	8
GWF4	63.5	0.2	36.2	0.1	100+	791.5	2.6	43.4	748.1	37.5	754.0	8
GWF5	45.2	6.1	26.2	22.4	100+	785.3	3.3	42.7	742.6	22.8	762.5	8
GWF6	66.2	0.2	33	0.7	100+	785.8	3.5	37.5	748.3	15.8	770.0	8
GWF7	64.5	1.3	29.5	3.5	100+	795.0	3.8	44.2	750.8	26.9	768.1	8
GWF8	16.8	15.4	9.4	58.4	100+	795.0	1.5	43.5	751.5	17.0	778.0	8
GWF9	62.5	0.6	33.4	3.5	100+	794.0	2.4	44.6	749.4	31.3	762.7	8
GWF10	64	0.1	33.5	2.5	100+	792.4	1.3	40.7	751.7	25.8	766.6	8
GWF11	69	1.6	21	8.8	100+	790.5	2.9	29.1	761.4	5.8	784.7	8
GWF12	0	20.9	0.2	78.9	0	790.9	2.1	15.9	775.0	5.0	785.9	8
GWF13	62.7	0	37.3	0	100+	791.3	3.5	41.5	749.8	21.4	769.9	8
GWF14	61.8	0.1	38.1	0	100+	790.5	2.4	36.6	753.9	22.3	768.2	8
LP5	62.9	0.4	33.8	2.9	100+	796.8	3.5	49.5	747.3	33.5	763.3	6
LP6	0.4	21	0.2	78.5	8	793.4	3.5	34.5	758.9	8.4	785.0	6
LP7	65.4	0	34.7	0	100+	791.5	4.3	51.7	739.8	11.2	780.3	6
LP8	62.5	0	37.5	0	100+	790.5	3.7	61.3	729.2	28.5	762.0	6
LP9	63.6	0	36.4	0	100+	796.2	2.9	64.1	732.1	18.5	777.7	6
MHE	NM	NM	NM	NM	NM	791.0	2.0	36.0	755.0	21.6	769.4	30
P1	63.5	0.1	32.5	3.9	100+	792.0	3.3	NM ⁽⁶⁾	NM ⁽⁶⁾	25.4	766.7	6
P2A	65	0	35	0	100+	793.6	3.2	71.8	721.8	52.1	741.5	3.75
P3A	63	0.1	36.9	0	100+	786.5	3.9	61.1	725.4	27.3	759.2	3.75
P8	62.5	0	37.5	0	100+	787.5	3.5	NM ⁽⁶⁾	NM ⁽⁶⁾	20.4	767.1	4
P9	0.4	20.6	0.3	78.7	8	785.3	6.1	35.9	749.4	7.3	778.0	4
P10	6.9	19.1	3.1	71.2	100+	785.1	3.6	NM ⁽⁶⁾	NM ⁽⁶⁾	23.4	761.7	4

Notes:

- (1) The "new" landfill comprises 26.8 acres located immediately east of the "old" landfill.
(2) Lower explosive limit, with 5 percent methane equivalent to 100 percent LEL.
(3) Elevation interpolated from March 4, 1999, aerial photography.
(4) Field measured, ground surface to top of PVC casing.
(5) Feet below ground surface.
(6) Existing leachate extraction equipment created an obstruction to lowering the PVC probe.

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By: JMT
QC: MJT

Table 2
Landfill Gas and Leachate Measurements in the Old⁽¹⁾ Landfill
H.O.D. Landfill

LOCATION	% CH ₄	% O ₂	% CO ₂	% BALANCE GAS	CALCULATED % LEL ⁽²⁾	GROUND SURFACE EL ⁽³⁾ (ft A.M.S.L.)	MEASURED STICKUP ⁽⁴⁾ (ft)	WELL DEPTH (ft BGS) ⁽⁵⁾	MEASURED BOTTOM OF WELL EL (ft A.M.S.L.)	LEACHATE LEVEL (ft BGS) ⁽⁵⁾	APPROXIMATE LEACHATE EL (ft A.M.S.L.)	WELL DIAMETER (in)
LP1	3.5	20.2	1.6	75.2	70	776.3	3.0	19.0	757.3	8.3	768.0	6
LP2	66.5	0.4	27.8	4.4	100+	785.9	2.5	33.5	752.4	16.9	769.0	6
LP3	14.4	17.4	3.7	65.7	100+	778.6	3.0	25.0	753.6	12.5	766.1	6
LP4	67.2	0.3	27.5	5	100+	788.7	2.3	36.7	752.0	16.1	772.6	6
LP10	66.6	0.4	25.6	6	100+	781.2	2.9	23.1	758.1	11.2	770.0	6
LP11	65.2	0.2	30.2	4.4	100+	787.7	3.1	27.9	759.8	15.7	772.0	6
LP12	69.5	0.2	24.7	4.6	100+	782.8	5.7	19.3	763.5	14.4	768.4	6
LP13	36.5	11.8	12.5	39.8	100+	779.5	2.8	15.3	764.3	13.1	766.5	6
LP14	69.7	0	26.1	4.2	100+	782.1	2.8	21.2	760.9	16.7	765.4	6
MHW	NM	NM	NM	NM	NM	791.3	2.0	32.0	759.3	24.5	766.8	30

Notes:

⁽¹⁾ The "old" landfill comprises 24.2 acres of the western third of the site.

⁽²⁾ Lower explosive limit with 5 percent methane equivalent to 100 percent LEL.

⁽³⁾ Elevation interpolated from March 4, 1999, aerial photography.

⁽⁴⁾ Field measured, ground surface to top of PVC casing.

⁽⁵⁾ Feet below ground surface.

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QC: MJT

2.1.3 Downhole Condition

A 4-inch-diameter, 4-foot-long section of PVC pipe was lowered to the full depth of each well in order to record obstructions and the amount of silt accumulation at the base of the wells. No obstructions were observed for any wells on the site. Total depth recordings are given in Tables 1 and 2. Minor silt accumulations (i.e., typically less than 6 inches) were observed when the PVC pipe probe was brought to the surface.

2.1.4 Examination of Landfill Cap

The landfill cap was examined for any signs of gas migration, such as stressed vegetation, odors, and (if the cover was saturated) gas bubbles emanating from the cover soil. The cover vegetation was observed to be in excellent condition, with the exception of several depressed, ponded areas in the new landfill area. Specifically, the cover around GWF 6 was saturated. Some surficial soil cracking was observed at the base of several wells in the new landfill, possibly due to settlement of the landfill mass around the well. Some stressed vegetation was observed near GWF 4. No seeps were observed on any of the sideslopes. Additionally, the cover was not observed to be saturated, with the exception of the area around GWF 6. Gas bubbles emanating from the saturated area around GWF 6 were not observed.

2.2 Gas Analysis

A Landtec GEM-500 portable gas analyzer was used to monitor for major gas constituents at each well location. As there were no sampling ports for any of the wells, measurements were accomplished by lowering tygon tubing approximately 2 feet into the well casing. The output of the gas analyzer is reported in percent by volume as shown in Tables 1 and 2. The GEM-500 was calibrated daily according to procedures outlined in the operations manual (Attachment D to the Field Sampling and Analysis Plan).

Landfill gas pressures could not be recorded during the field data collection. This was due to the fact that all wells were not adequately sealed from atmospheric pressure (i.e., there were no isolation valves or gas sampling ports). However, visual observations were recorded in the field notebook (Appendix A) indicating that a positive pressure build-up condition existed at a number of the gas well flares.

2.3 Evaluation of Landfill Gas Migration Potential

2.3.1 Southern Boundary

A series of wetlands traverse the southern site boundary, which reduce and/or eliminate the gas migration potential in this direction. In addition, Sequoit Creek runs along the southern site boundary. Landfill gas cannot readily migrate horizontally through saturated soil or standing water; therefore, the potential for migration to the south is considered to be very low. The exception is in the southeastern corner of the landfill where a thin unsaturated soil zone is present. For the southern boundary, geologic Cross Section A-A' of the RI (Appendix D) demonstrates that shallow water surface is at, or very close to, the surface. In addition, the incorporation of an active gas management system into the RD/RA will reduce the potential risk of landfill gas migration in this area.

2.3.2 Western Boundary

Again, Sequoit Creek forms the western site boundary. Per the RI, Sequoit Creek is hydraulically connected to the surficial sand unit. The shallow groundwater system in this portion of the site either discharges to, or receives flow from, the creek, dependent on the time of the year. Similar to the southern boundary, landfill gas cannot migrate horizontally through saturated soil or standing water; therefore, the potential for migration to the west is considered to be very low. An active gas management system will be included in the RD/RA to reduce the risk of landfill gas migration in these areas.

2.3.3 Eastern and Northern Boundaries

A thin (i.e., typically less than 10-foot-thick), unsaturated soil (composed of fine-grained material) zone is present outside the eastern and northern landfill perimeter. An active gas management system will be included in the RD/RA to reduce the risk of landfill gas migration in these areas.

Section 3

Leachate System Evaluation

3.1 Condition of Above-grade Wells and Extraction Points

As noted in the PDI field notebook (Appendix A), the PVC riser pipes for the gas well flares, leachate probes, and extraction points were generally in good condition. However, due to settlement of the waste mass relative to the well assemblage, the top of the steel protective casings often were below the top of the PVC riser pipes.

3.2 Well Data

Field measurements were made of the 14 existing leachate probes (LP 1 through LP 14) and the extraction points (P1, P2A, P3A, P8, P9, and P10), including stick-up height, total depth, and liquid depth. This information is given in Tables 1 and 2 along with data on the as-constructed screen interval. Full details on the construction of these wells is included as Appendix C.

3.3 Downhole Condition

A 4-inch-diameter, 4-foot-long section of PVC pipe was lowered to the full depth of each well in order to record obstructions and the amount of silt accumulation at the base of the wells. The total well depths were not measured for P1, P8, and P10 because the existing leachate extraction equipment created an obstruction to lowering of the PVC probe. Otherwise, no obstructions were observed for the remaining wells on the site. Total depth recordings are given in Tables 1 and 2. Again (as noted in the landfill gas section), very little (if any) silt accumulation was observed when the PVC pipe probe was brought to the surface.

3.4 Existing Leachate Extraction Components

Supporting equipment for the two existing leachate extraction manholes (MHE and MHW) was in operation during this PDI field investigation. Leachate extracted from these manholes equipped with leachate pumps is routed to, and stored in, a dedicated tanker truck for subsequent removal from the site.

The supplemental leachate extraction system (consisting of extraction points P1, P2A, P3A, P8, P9, and P10, and an above-grade transfer system), was not in operation during this PDI field investigation. With the exception of P1, the well diameters of the supplemental leachate extraction points were 4 inches or less (see Table 1). Corrugated steel manholes encased extraction points P1, P8, P9, and P10. The transfer system typically consisted of a 1 1/4-inch

leachate transfer line, a ½-inch compressed air line, and a heat tracer (Raychem Chemflex auto-trace parallel self regulating). The leachate lines were encased with insulation.

3.5 Static Leachate Volume

A calculation was completed to estimate the current volume of extractable leachate in the landfill based on leachate levels measured during this investigation and a lower leachate level of 761 feet above mean sea level (A.M.S.L.). Based on this calculation set (Appendix E), a static volume of 16.3 million gallons is expected to be extracted to lower landfill leachate levels.

To maintain an approximate lower leachate level of 761 feet A.M.S.L., continued extraction would be required to account for infiltration, inflow from the surrounding aquifer, recovery of perched leachate, and continued waste consolidation.

Section 4

Summary of Key Findings and Conclusions

4.1 Landfill Gas

- The presence of surface water bodies and wetlands bordering the site (e.g., Sequoit Creek) limit the potential for gas to migrate off-site along the site's western and southern perimeter. An unsaturated soil zone is present along portions of the eastern and northern landfill perimeter. The potential for this unsaturated zone to allow a pathway for horizontal LFG migration should be evaluated during the RD phase.
- Existing leachate probes (LP 1 through LP 14) and leachate extraction points (P1, P2A, P3A, P8, P9, and P10) are suitable for conversion to an active LFG extraction system because (1) well screens are situated throughout the waste mass with sufficient top cover, (2) well construction details indicate that the well pack and surface seals were adequately constructed for this conversion, and (3) physical inspection indicates that the wells are in good condition.
- For the above reasons, existing gas well flares (GWF 1 through GWF 14) are also suitable for continued use as LFG extraction wells with retrofits at the surface to account for differential settlement experienced and expected regrading and cover placement.

4.2 Leachate Collection System

- Existing leachate probes (LP 1 through LP 11, and LP 14), gas well flares (GWF 1 through GWF 10, GWF 13, and GWF 14), and leachate extraction points are suitable for incorporation into an active leachate extraction system because (1) the base of the well screens are below elevation 761.7 feet A.M.S.L., which is the approximate average low shallow water level based on water level readings taken during the dry years of 1992, 1994, and 1995 (RMT, 2000); (2) physical inspection indicates that the wells are in good condition; and (3) the well diameters are large enough to lower typical extraction pumps to the base of the well with no obstructions noted during the PDI field investigation. The elevation of the shallow groundwater level will be confirmed in the groundwater PDI report.
- Locations LP 12, LP 13, and GWF 12 may not be suitable for incorporation into the active system because the measured total depths were 763.5, 764.2, and 775.0 feet A.M.S.L., respectively.
- Leachate extraction points P2A, P3A, P8, P9, and P10 are not suitable for incorporation into the proposed leachate management system because the small-diameter of the well casings (i.e., less than 4 inches) would prevent the installation of the proposed leachate extraction pumps.

- The existing extraction pump appurtenances, leachate transfer piping, and leachate storage facilities are not appropriate for incorporation into a long-term collection system; therefore, reuse should not be considered.
- The two existing leachate extraction manholes (MHE and MHW) can be incorporated into the final leachate collection system, with some retrofit being necessary to account for the shifting of the stacked manhole section units.

Section 5

References

Montgomery Watson. 1997. Remedial investigation/feasibility study. H.O.D. Landfill, Antioch, Illinois. January 1997.

Montgomery Watson. 1998. Draft feasibility study. H.O.D. Landfill, Antioch, Illinois. February 1998.

RMT, Inc. 1999. Predesign investigation and remedial design/remedial action workplan. H.O.D. Landfill site, Antioch, Illinois. September 1999.

RMT, Inc. 2000. Prefinal remedial design report. H.O.D. Landfill site, Antioch, Illinois. April 2000.

Appendix A

Field Notebook



FIELD WORK TITLE PAGE

PROJECT NAME:	<u>H.O.D. LANDELL ENGINEERING</u> <u>PREDESIGN INVESTIGATION</u>
PROJECT NUMBER:	<u>5314.04</u>
LOCATION:	<u>ANTIOCH, ILLINOIS</u>
DATES OF FIELD WORK:	<u>NOVEMBER 8-9, 1999</u>
PURPOSE OF FIELD WORK:	<u>PREDESIGN STUDY TO DETERMINE</u> <u>THE VIABILITY OF USING EXISTING</u> <u>EXTRACTION POINTS AS PART OF</u> <u>A DUAL EXTRACTION SYSTEM</u>
WORK PERFORMED BY:	<u>JAMES TINJUM</u> <u>MARK TORRESANI (11/08/99 A.M.)</u>

James M. Tinjum
Signed

11/09/99
Date

Mark J. Torresani
QC'd By

1/5/2000
Date

1



GENERAL NOTES

PROJECT NAME: HDD LANDFILLDATE: 11/08/99PROJECT NUMBER: 5314.04AUTHOR: JAMES TINJUMTIME ARRIVED ON-SITE: 9:15TIME LEFT SITE: 18:00WEATHER: SUNNY, FORECAST HIGH NEAR 70° F

WORK/SAMPLING PERFORMED:

GAS, LEACHATE DEPTH, AND WELL DEPTH
MEASUREMENTS AT THE FOLLOWING LOCATIONS:
LP1, LP2, LP3, LP4, LP10, LP11, LP12, LP13, LP14, GWF1, LP5,
GWF9, GWF10, LP6, GWF11, PID, GWF2, P1, GWF3

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

DID NOT DETERMINE TOTAL DEPTHS AT P1
AND PID DUE TO EXISTING PUMPING
EQUIPMENT IN WELLS.

COMMUNICATIONS:

Name/Representing: JOE CORNS (SUB TO OVERSITE KR,
WESTON)

Subject/Comments:

9:25 JOE WILL BE PROVIDING OVERSITE FOR
TODAY'S WORK. NOTED THAT A
REPRESENTATIVE FROM USEPA MAY ALSO
STOP BY TODAY

QC'd By: MJT 2



GENERAL NOTES

PROJECT NAME: HOD ENGINEERING PDI DATE: 11/09/99
PROJECT NUMBER: 5314.04 AUTHOR: JAMES TINJUM
TIME ARRIVED ON-SITE: 6:20 TIME LEFT SITE: 17:20

WEATHER: MOSTLY SUNNY, LIGHT BREEZE FROM SOUTHWEST
AM: 59° F WHEN ARRIVED ON SITE

WORK/SAMPLING PERFORMED:

GAS, LEACHATE DEPTH, AND WELL DEPTH READINGS
AT THE FOLLOWING LOCATIONS: GWFS 3, 4, 5, 6, 7, 8, 12, 13,
AND 14; LPS 8 AND 9; P2A, P3A, PB, AND PD.
CONDUCTED WELL STICKUP MEASUREMENTS AND CONDITION
OF WELLS (COVER OBSERVATIONS). RECORDED DEPTHS
PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN: AND LEVELS IN MHE
AND MHW.

→ A FIRE WAS OBSERVED ON PROPERTY APPROXIMATELY
1 MILE SOUTHEAST OF SITE. NO AFFECT ON
FIELD INVESTIGATION.

COMMUNICATIONS:

Name/Representing: RON MURAWSKI / USEPA

Subject/Comments: NO ^{PT} RON NOTED THAT HE DIDN'T
EXPECT US (RMT & WMI) TO MEET THE
AGGRESSIVE PD SCHEDULE SET DUE TO
REVIEW PROCESSES.

JOE CORNS → ON SITE FOR USEPA OVERSIGHT.

3

QC'd By: MJT



GENERAL NOTES

PROJECT NAME: _____

DATE: _____

PROJECT NUMBER: _____

AUTHOR: _____

TIME ARRIVED ON-SITE: _____

TIME LEFT SITE: _____

WEATHER:

WORK/SAMPLING PERFORMED:

PROBLEMS ENCOUNTERED/CORRECTIVE ACTIONS TAKEN:

COMMUNICATIONS:

Name/Representing:

Subject/Comments:

INTENTIONALLY NOT USED

QC'd By: _____

**H.O.D. LANDFILL
LANDFILL GAS AND LEACHATE MONITORING**

Date: <u>11/08/99</u> Field Technician: <u>JAMES TINJUM</u> Signature: <u>James M. Tinjum</u> <u>✓ MFT</u>	Air Temperature: <u>60-70</u> °F Atmospheric Barometric Pressure: _____ in. Hg R/F Weather Conditions: <u>SUNNY & BREEZY</u> Ground Conditions: _____ Gas/O ₂ Meter Model: <u>LANDTEC GMI/1 GEM 500</u> Gas/O ₂ Meter Serial No.: <u>EOB12</u> Date Last Calibrated: <u>10/22/99</u>
---	--

Extraction Wells	% CH ₄	% CH ₄ LEL	% O ₂	% CO ₂	Balance Gas %	% LEL	Depth to Leachate (')	Well Depth (')	Screen Interval	Well Condition/Comments
LP1	3.5		20.2	1.6	75.2		11.3	22		
LP2	66.5		0.4	27.8	4.4		19.4	36'		
LP3	14.4		17.4	3.7	65.7		15.5	28'		
LP4	67.2		0.3	27.5	5.0		18.4	39'		
LP5	62.9		0.4	33.8	2.9		57.0	53'		GAS VAPORS READILY OBSERVED WHEN CAP OFF
LP6	0.4		21.0	.2	78.5		11.9	38'		
LP7	65.4		0.0	34.7	0.0		15.5	56'		

H.O.D. LANDFILL
LANDFILL GAS AND LEACHATE MONITORING

Extraction Wells	% CH ₄	% CH ₄ LEL	% O ₂	% CO ₂	Balance Gas %	% LEL(2)	Depth to Leachate(1)	Well Depth(2)	Screen Interval	Well Condition/Comments
LP8	66.5 62.5		0.4 0.0	27.8 37.5	4.4 0.0		32.2	65'		
LP9	63.8		0.0	36.4	0.0		21.4 24.4	67'		20' ± OF LEACHATE DILY RESIDUE ON T.D. ROPE
LP10	66.6		0.4	25.6	6.0		14.1	26'		
LP11	65.2		0.2	30.2	4.4		18.8	31'		
LP12	69.5		0.2	24.7	4.6		20.1	25'		
LP13	36.5		11.8	12.5	39.8		15.8	18'		
LP14	69.7		0.0	26.1	4.2		19.5	24'		CONDENSATE NOTED
GWF1	64.0		0.1	32.7	3.1		33.4	42'		PREVIOUS MEASUREMENTS 35' 4" TO LIQUID 41' 6" TO BOTTOM
GWF2	64.0		0.3	32.9	3.0		30.8	48'		PREVIOUS MEASUREMENTS 30' 9" TO LEACHATE 47' 1" TO BOTTOM
GWF3	62.5		0.2	32.9	4.1		39.1	44'		+ LOTS OF POSITIVE PRESSURE IN WELL PREV. READING SAID 38' 3"
GWF4	63.5		0.2	36.2	0.1		40.1	46'		PREVIOUS READING ON DUCT TAPE IS 39' 10" + SUBSTANTIAL POSITIVE PRESSURE

H.O.D. LANDFILL
LANDFILL GAS AND LEACHATE MONITORING

Extraction Wells	% CH ₄	% CH ₄ LEL	% O ₂	% CO ₂	Balance Gas %	% LEL ⁽²⁾	Depth to Leachate ⁽¹⁾	Well Depth ⁽¹⁾	Screen Interval	Well Condition/Comments
GWF5	45.2		6.1	26.2	22.4		26.1	46'		PREV. MEAS. 26' 4" TO LID. 45' 3" TD
GWF6	66.2		0.2	33.0	0.7		19.3	41'		CAN HEAR GAS 'BUBBLING' IN PREV. MEAS.: 19' 7" & 41' TD
GWF7	64.5		1.3	29.5	3.5		30.7	48'		WELL PROBE COVERED WITH OILY RESIDUE WHEN EXTRACTED
GWF8	16.8		15.4	9.4	58.4		18.5	45'		PREVIOUS READINGS 18'-8" TO LEACHATE 45'-3" TO BOTTOM
GWF9	62.5		0.6	33.4	3.5		33.7 ⁽¹⁾	47'		(1) OILY RESIDUE ON PROBE & ON ROPE
GWF10	64.0	64.0 ^{MS}	0.1	33.5	2.5		27.1	42.5'		WELL WAS DUCT TAPED
GWF11	69.0		1.6	21.0	8.8		8.7 ⁽¹⁾	32'		(1) PREVIOUS MEAS. WAS 8' 10"
GWF12	0.0		20.9	0.2	78.9		7.1	18'		NO PRESSURE BUILDUP NOTED
GWF13	62.7		0.0	37.3	0.0		24.9	45'		PREVIOUS MEASUREMENTS LIQUID @ 29' 44' 10" TO BOTTOM
GWF14	61.8		0.1	38.1	0.0		24.7	39'		CAN HEAR GAS BUBBLING IN VIGOROUSLY PREV. MEASUREMENT 24' 4" TO WATER 38' 8" TO BOTTOM

H.O.D. LANDFILL
LANDFILL GAS AND LEACHATE MONITORING

Extraction Wells	% CH ₄	% CH ₄ LEL	% O ₂	% CO ₂	Balance Gas %	% LEL ⁽¹⁾	Depth to Leachate ⁽¹⁾	Well Depth ⁽¹⁾	Screen Interval	Well Condition/Comments
P1	63.5		0.1	32.5	3.9		28.6	NM		
P2A	65.0		0.0	35.0	0.0		55.3	75' ⁽¹⁾		1" INSIDE WELL ϕ = 3 3/4" THUS COULD NOT GET PVC PROBE DOWN, MEASUREMENT BY TAPE W/ WIRE
P3A	63.0		0.1	36.9	0.0		31.2	65'		COULD NOT GET PVC PROBE DOWN BECAUSE PVC CASING IS 3 3/4"
P8	62.5		0.0	37.5	0.0		23.9	NM		
P9	0.4		20.6	0.3	78.7		13.4	42'		NO PUMPS OR ACCESSORIES DOWN HOLE
P10	6.9		19.1	3.1	71.2		* 27.0'	NM		* NO WATER TO A, MAX. DEPTH OF 27'

Note:

(1) All depths are recorded from the top of the well casing.

NM = NOT ABLE TO MEASURE



COMPUTATION SHEET

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SHEET

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OF

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PROJECT/PROPOSAL NAME	PREPARED	CHECKED	PROJECT/PROPOSAL NO.
HQD LANDFILL, ENGRG. PDI	By: JMT Date: 11/04/97	By: JMT Date: 11/04/97	5314.04

9:41 CALIBRATION OF LANDTEC

ZERO'D TO ATMOSPHERE → OK

ZERO'D CO_2 → CH_4 TO ATMOSPHERE → NO CHANGE

CHECK CH_4 CALIBRATION TO CONTROL (15%)

READ 15.0% → OK

CHECK CO_2 CALIBRATION TO CONTROL (15%)

READ 15.0% → OK

CHECK O_2 CALIBRATION TO CONTROL (4%)

READ 3.9% → OK

10:05 CALIBRATION OF 580B DVM

SPAN PPM = 0097 OK (READS 97.9 PPM)

^
ISOBUTYLENE @ 97 PPM

10:30 BEGIN MEASUREMENTS AT GWF 10

PHOTO 0 , GWF 10

10:55 ARRIVE AT LP 14

PHOTO 1

11:10 ARRIVE AT LP 12

PHOTO 2

MARK TORRESANI LEAVES SITE ✓

11:27 ARRIVE AT LP 13

PHOTO 3

11:46 ARRIVE AT LP 10

PHOTO 4



COMPUTATION SHEET

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PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NO.
HOD ENGINEERING PDI	By: JMT Date: 11/08/09	By: [Signature] Date: 11/11/09	5314.04

11:59 ARRIVE AT LP3
PHOTO 5

12:20 BREAK FOR LUNCH

12:55 BACK ON SITE

13:05 ARRIVE AT LP4 - PHOTO 6

13:22 ARRIVE AT LPI - PHOTO 7

13:36 ARRIVE AT LP2 - PHOTO 8

13:54 ARRIVE AT LPII - PHOTO 9

CASING CAP IS 3½' ELEVATED

14:09 ARRIVE AT PID - PHOTO 10

14:30 ARRIVE AT GWF 11 - PHOTO 11

14:46 ARRIVE AT LP6 - PHOTO 12

15:10 ARRIVE AT GWF 9 - PHOTO 13

15:29 ARRIVE AT LP5 - PHOTO 14

15:44 ARRIVE AT GWF1 - PHOTO 15

16:01 ARRIVE AT GWF2 - PHOTO 16

16:15 ARRIVE AT PI - PHOTO 17

16:24 ARRIVE AT GWF3 - PHOTO 18

16:36 JOE CORNS NEEDS TO LEAVE SITE,

I NOTE THAT I WILL CLEAN UP AND
DECON. FOR REMAINDER OF DAY

17:05 LEAVE SITE TO PURCHASE LOCK FOR FRONT GATE

18:00 APPLY NEW LOCK, LEAVE SITE.

- END OF DAY -

JMT



COMPUTATION SHEET

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SHEET

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OF 19

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NO.
HOD ENGINEERING'S PDI	By: JMT Date: 11/1/99	By: JMT Date: 11/1/00	5314.04

6:40 CALIBRATE LANDTEC

ZERO'D PRESSURES → OK

CH₄ ZERO'D → OKCH₄ SPAN (15.0%) → READS 15.0% OKCO₂ SPAN (15.0%) → READS 14.9% OKO₂ ZERO'D → OKO₂ SPAN (4.0%) → READS 4.0% OK

MEASURE BACKGROUND CONCENTRATIONS

CH₄ 0.0%CO₂ 0.1%O₂ 20.9%

BAL 79.0%

100% OK

6:59 CALIBRATE 580B OVM

RF = 1.0

LAMP = 10.0 eV

RESET TO ZERO GAS → OK

USE 97 ppm ISOBUTYLENE SPAN GAS

SPAN CALIBRATION OK

CHECK LANDFILL BACKGROUND

000.5 PPM MAX OK

7:13 ARRIVE AT GWF 12 - PHOTO 19

7:35 ARRIVE AT GWF 8 - PHOTO 20

7:49 ARRIVE AT LP 7 - PHOTO 21

8:05 PHOTO OF GWF 3 (#22)

→ OUTWARD PRESSURE 'BULGING' DUCT TAPE



COMPUTATION SHEET

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PROJECT/PROPOSAL NAME	PREPARED	CHECKED	PROJECT/PROPOSAL NO.
HOD ENGINEERING PDI	By: JMT Date: 11/9/01	By: JMT Date: 11/9/01	53M.04

8:09 ARRIVE AT P2A - PHOTO 23

I.D. OF PVC WELL IS 3 3/4"

8:29 ARRIVE AT GWFA - PHOTO 24

8:44 OVERSITE KR ARRIVES, JOE CORNS

8:49 ARRIVE AT LPB - PHOTO 25

9:02 ARRIVE AT GWF 13 - PHOTO 26

- CAN 'HEAR' GAS 'BUBBLING' INTO WELL
- HEAVY POSITIVE PRESSURE

9:19 ARRIVE AT GWF 14 - PHOTO 27

9:35 RON MURAWSKI ARRIVED ON SITE

DISCUSSED GENERAL PROCEDURES,
WHAT HAS BEEN DONE TO DATE,
REMEDIAL SCHEDULE & ACCESS AGREEMENTS

9:57 ARRIVE AT LP9 - PHOTO 28

BROWNISH, OILY RESIDUE ON ROPE USED
TO MEASURE TOTAL DEPTH, PVC PIPE
USED ALSO COATED.

10:19 ARRIVE AT GWF 6 - PHOTO 29

10:37 ARRIVE AT GWF 5 - PHOTO 30

MEASURED BREATHING ZONE

0.0 PPM BY OVM 580 B

11:04 ARRIVE AT P3A - PHOTO 31

11:26 ARRIVE AT PB - PHOTO 32, 33

11:39 ARRIVE AT P9 - ~~PHOTO 34~~ (PHOTO NOT TAKEN)

11:55-12:45 LUNCH WITH RON MURAWSKI AND JOE CORNS



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SHEET

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OF

19

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NO
HOD ENGINEERING PDI	By: JMT Date: 11/15/11	By: JMT Date: 11/15/11	5314.04

12:55 ARRIVE AT GWF-7 - PHOTO 353A *JK*H₂S OVM READING IN
BREATHING ZONE = 0.5 PPM13:16 BEGIN WELL STICK UP AND CONDITION
OBSERVATIONS

→ GWF 7 3' 9 1/2" TO FLARE FLANGE
PVC RUST STAINED, SLIGHTLY OFF VERTICAL
FLARE RUSTED BUT NOT DEGRADED, SURROUNDING
COVER IN GOOD CONDITION

13:20 → GWF 3 3' 0" TO FLARE FLANGE
POSITIVE PRESSURE, SOME CONDENSATE DRIPS,
FLARE RUSTED, FLARE BUCKET CRACKED/
BRITTLE, NOT HEAVILY CORRODED, COVER IN
GOOD CONDITION

13:25 → P2A 3' 7 1/2" TO 6" STEEL CASING TOP
PVC 5 1/2" BELOW CASING TOP (3 3/4" ID)
SURFACE GROUT/CONCRETE BROKEN
COVER IN GOOD CONDITION

13:29 → GWF 4, HEAVY POSITIVE PRESSURE

2' 6 3/4" TO FLARE FLANGE

FLARE BUCKET CRACKED WITH WHITE RESIDUE
FLARE COATED w/ GREY/BLACK RESIDUE

SOME STRESSED VEGETATION, OTHERWISE GOOD COVER 13

13:33 → LP8 2' 11" TOP CASING (RUSTING/CORROSION)

9" PLUS TO TOP PVC (NO PVC CAP)

FEW DEPRESSED HOLES (1-2' Ø) NEARBY, APPROX 6" DEPRESSED



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SHEET

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OF

19

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NO.
DD ENGINEERING PD/	By: JMT Date: 1/14/00	By: JMT Date: 1/14/00	531A.04

13:38 → GWF 13 3'5½" TO FLARE FLANGE

DRIP COATING ON PVC

FLARE SLIGHTLY RUSTED, FLARE ARRESTOR
CRACKED / BROKEN

COVER CRACKED AT PVC SURFACE ENTRANCE

13:41 GWF 6 3'6½" TOP OF PVC (BROKEN OFF
SLIGHTLY BELOW FLARE FLANGE

TILTED ≈ 10°

COVER IS LOW WITH STANDING WATER AND
CATTAILSFLARE HEAVILY RUSTED, FLARE ARRESTOR
RUSTED / CORRODED13:45 GWF ~~14~~ 2'4¼" TO FLARE FLANGE

COVER IN GOOD CONDITION

FLARE W/ SOME RUST, ARRESTOR RUSTED / CORRODED

13:47 LP 9 2'5" TO TOP CASING (RUSTED)
5½" PLUS TO PVC TOPCASING HAS SETTLED, SURFACE CRACKS
OTHERWISE, COVER WELL VEGETATED

13:50 → GWF 5, SOME DRIPS ON PVC

3'4" TO TOP OF PVC

FLARE SLIGHTLY RUSTED, ARRESTOR CRACKED /
CORRODED HEAVILY

COVER DEPRESSED TO SOUTH SLIGHTLY

13:53 P3A 4'3¼" TOP OF STEEL CASING

WHICH SITS LOOSE AT GRADE (SURFACE SEAL POOR)

4¼" MINUS TO TOP PVC, COVER OK

PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NO.
HOD ENGINEERING PDI	By: JMT Date: 11/19/00	By: [Signature] Date: 11/14/00	5314.04

14:00 → P1

EXTRACTION POINT WITH CORRUGATED STEEL MANHOLE

ESI LIQUID LEVEL INDICATOR

STEEL CABLE PULLEY

3' 3" STICKUP (TOP PVC)

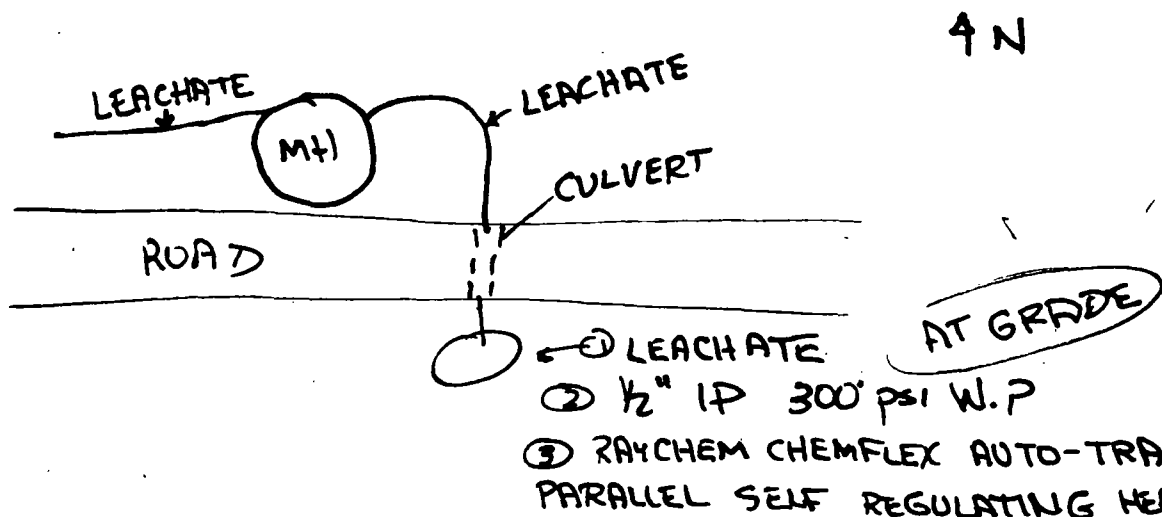
DOWNHOLE IS LEACHATE LINE (1 1/4" OD)

AIR LINE (1/2" OD)

3/4" PZ (PVC) LINE

ELECTRIC LINE (?)

INSULATION HEAVILY DETERIORATED



14:11 → GWF 2 1" 7" PVC STICKUP (ORANGE/RED STAINED)

FLARE AND ARRESTOR RUSTED

3' Ø BARE SPOT AROUND WELL

14:14 → GWF 8 1' 6 1/4" PVC STICKUP (NOT STAINED)

FLARE RUSTED, ARRESTOR IN GOOD CONDITION
COVER IN GOOD CONDITION

14:16 → LP7 2' 9 1/4" TO TOP CASING

PLUS 1' 6" TO TOP PVC

LOW N-S SWALE 15'± TO WEST

PVC ORANGISH TINT

WELL CASING AREA HAS SETTLED



COMPUTATION SHEET

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PROJECT / PROPOSAL NAME	PREPARED	CHECKED	PROJECT / PROPOSAL NO.
HOD ENGINEERING PDI	By: JMT Date: 11/15/99	By: JMT Date: 11/15/99	5314.04

14:20 ~~GWF 8 1' 7" PVC STICKUP (NO STAINING)~~
~~FLARE RUSTED, ARRESTOR IN GOOD CONDITION~~
~~COVER IN GOOD CONDITION~~

14:23 PHOTO ~~36³⁵~~, F N

REPEAT MEASUREMENT JMT

ELECTRIC POLE BETWEEN SHED & GWF 11

14:26 → GWF 11 2' 10 1/2" PVC STICKUP (NOT STAINED)
FLARE RUSTY, ARRESTOR ONLY SLIGHTLY RUSTED
COVER IN GOOD CONDITION

14:28 → LP6 3' 6" TO TOP CASING

PLUS 1/4" TOP PVC

MINOR STAINS, STEEL CASING RUSTED
CASING SLIGHTLY DEPRESSED, OTHERWISE
COVER IN GOOD CONDITION

14:31 → GWF 9 2' 4 1/4" TO FLARE FLANGE

PVC WELL STAINED (ORANGE/RED)

FLARE RUSTY, NO ARRESTOR OBSERVED
COVER IN GOOD CONDITION

14:33 → LP5 3' 6 1/4" TOP CASING

MINUS 1/2" TOP PVC

CASING HAS ORANGE STAINED DRIPS TO
GROUND, COVER/VEGET. IN GOOD CONDITION

14:36 → GWF 6 1' 5 1/2" FLANGE FLARE

ARRESTOR HEAVILY CORRODED, CRACKED

COVER SLIGHTLY DEPRESSED, VEGETATION GOOD

14:39 PHOTO ~~36³⁷~~ 36 JMT

MAJOR FIRE SMOKE PLUME SE OF SITE

PROJECT/PROPOSAL NAME	PREPARED	CHECKED	PROJECT/PROPOSAL NO.
HOD ENGINEERING PDI	By: JMT Date: 11/9/09	By: JMT Date: 11/11/09	5314.04

15:02 FROM RADIO

5-ALARM BRUSH FIRE TO SW. OFF OF HWY 173

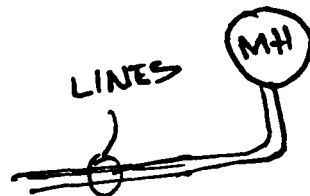
NOTED TO JOE THAT IF I SAW ANY HINTS OF FIRE, I WAS GOING TO ABANDON SITE FOR DAY

15:04 → PB EXTRACTION POINT WITH CORRUGATED STEEL MANHOLE

2' 9 1/2" TO CASING TOP
PLUS 8 3/4" TOP PVC

HAS PB, LEACHATE, AND AIR DOWN HOLE
PLUS CABLE

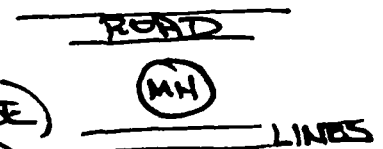
ROAD



15:10 → PA No LINES GOING DOWN HOLE

CABLE PULLEY IN PLACE

LINES RUN TO SOUTH (AT GRADE)
5' 9 1/2" TOP CASING (HEAVILY RUSTED)
PLUS 4" TOP PVC



15:16 → GWF 12

2' 1" TO TOP PVC STICKUP (SOME ORANGE DISCOLORING)

FLARE AND ARRESTOR BOTH LIGHTLY RUSTED

LOW/WET AREA SOUTH AND WEST (OTHERWISE

COVER AND VEGETATION GOOD)

AT GRADE LEACHATE LINE RUNS 15' TO SOUTH

17

15:20 → P 10 CABLE, LEACHATE, AND AIR HEATING DOWNHOLE

2' 0" TOP CASING KINKED
1' 7 1/2" PLUS TO TOP PVC



↑ N



COMPUTATION SHEET

744 Heartland Trail P.O. Box 8923 Madison, WI 53708-8923 (608) 831-4444 FAX (608) 831-3334

SHEET 18 OF 19

PROJECT/PROPOSAL NAME	PREPARED	CHECKED	PROJECT/PROPOSAL NO.
HOD ENGINEERING PD)	By: JMT Date: 11/19/99	By: MZ Date: 11/19/99	5314.04

15:25 → GWF 10 1'4" PVC STICKUP (ORANGE STAINED)
FLARE AND ARRESTOR RUSTED (EXCEPT BOTTOM SECTION)
COVER IN GOOD CONDITION, TWO SMALL TREES 20' WEST

15:30 → LP11 2'9" TOP CASING
PLUS 4'4" TOP PVC

DEPRESSION IMMEDIATELY AROUND STEEL CASING,
OTHERWISE COVER GOOD ~~STET~~ ~~STET~~

15:33 F W, NW PHOTOS 0, 1, 2

ELECTRIC POWER COMING TO SITE

15:35 → LP 4 2'5" CASING STICKUP
- 1 1/2" TO PVC TOP (STAINED GREY)
COVER IN GOOD CONDITION

15:37 → LP2 2'5 1/2" CASING STICKUP (RUSTED)
+ 3/4" PVC TOP
COVER IN GOOD CONDITION

15:40-15:48 JOE CORNS LEAVING

→ NOTED THAT PDI WENT PER WORKPLAN AND
HE WILL RELAY THAT TO WESTON AND EPA.

15:51 → LP1 3'3 1/4" CASING STICKUP
- 3 1/2" TOP PVC (CLEAN)
COVER GOOD, CASING SLIGHTLY DEPRESSED

15:56 LP3 3'4" CASING STICKUP (SLIGHTLY DEPRESSED)
- 3 3/4" TOP PVC
GOOD VEGETATION

15:58 LP10 3'1 1/4" CASING STICKUP } GOOD VEGETATION
- 2 3/4" TO TOP PVC

16:00 LP13 2'9" CASING & PVC STICKUP (CLEAN) 18
GOOD VEGETATION

16:02 LP12 2'3 3/4" CASING STICKUP
- 3/4" TO TOP PVC (ORANGE STAINED)
COARSE SAND AROUND CASING AT BASE

16:05 LP 14 2'8" TOP CASING
+ 1 1/2" TO TOP PVC (CLEAN)

COARSE SAND SEAL IS SLIGHTLY DEPRESSED,
OTHERWISE VEGETATION GOOD

16:12 MHW PHOTO 3

26.5' TO LEACHATE FROM CONCRETE RING TOP
- 2'0" TO GRADE

2'1" MANHOLE SECTIONS
34' TOTAL DEPTH

16:19 EMH PHOTO 4,5

23.6' TO LEACHATE FROM MH TOP

- 2'0" TO GRADE

37.5' TOTAL DEPTH

Appendix B

Photographs



**Roll 1, Photograph 30, Facing Northeast
11/09/99 at 10:37, View of GWF 5**



**Roll 1, Photograph 18, Facing Northeast
11/08/99 at 16:24, View of GWF 3**



Roll 1, Photograph 13
Facing Northeast
11/08/99 at 15:10
View of GWF 9



Roll 1, Photograph 6
Facing Northwest
11/08/99 at 13:05
View of LP 4



Roll 1, Photograph 17, Facing Down
11/08/99 at 16:15, View of P1



Roll 1, Photograph 33, Facing Southeast
11/09/99 at 11:26, View of P8



Roll 2, Photograph 4, Looking Down
11/09/99 at 16:19, View Down Eastern Manhole



Roll 2, Photograph 5, Facing Northwest
11/09/99 at 16:19, View of Leachate Storage Tank and Appurtenances

Appendix C

Well Construction Details

TABLE 1-5
SUMMARY OF MONITORING WELL CONSTRUCTION DETAILS
H.O.D. LANDFILL
ANTIOCH, ILLINOIS

Well #	Completion Date	Coordinates		Ground Elev	TOIC Elev	Total Depth	Well/Screen Materials	Screen Length	Stratigraphy at Screen	Top of Sand Pack		Screen Interval			Screen Interval		
		North	East							Depth	Elev	Depth		Elevation			
EPA Wells																	
US1S	5/22/87	2115302.72	1053552.35	766.5	768.69	12.41'	stainless	5.7'	silty sand & gravel	3.50	763.00	6.71	to	12.41	759.79	to	754.09
US1D	5/27/87	2115302.79	1053547.83	766.9	768.88	92.41'	stainless	5.7'	f-med Sand	81.00	685.90	92.41	to	86.71	674.49	to	680.19
US2D	6/16/87	2114832.02	1050654.41	768.2	770.73	112.77'	pvc	8.3'	sand & gravel	103.00	665.20	104.47	to	112.77	663.73	to	655.43
US3S	6/2/87	2115488.87	1050515.19	767.1	770.48	22.5'	stainless	5.7'	sand & gravel	13.50	753.60	16.81	to	22.51	750.29	to	744.59
US3I	6/10/87	2115483.04	1050532.52	767.01	769.93	58'	pvc	3'	CL to SC	52.50	714.51	55	to	58	712.01	to	709.01
US3D	6/3/87	2115486.53	1050523.96	767.1	769.72	83'	pvc	5.3'	fine-med sand	73.50	693.60	77.28	to	82.58	689.82	to	684.52
US4S	6/17/87	2115388.68	1050754.78	771.1	773.67	23'	stainless	5.7'	sand & gravel	15.00	756.10	17.17	to	22.87	753.93	to	748.23
US4D	6/23/87	2115377.82	1050754.38	770.5	772.7	103.84'	stainless	5.7'	fine-med. silt	94.00	676.50	98.14	to	103.84	672.36	to	666.66
US5D	6/29/87	2116743.35	1050757.09	765.1	767.73	93.14'	stainless	5.7'	sand & gravel	84.00	681.10	87.44	to	93.14	677.66	to	671.96
US6S	7/10/87	2115367.32	1051516.03	767.1	769.9	41.7'	stainless	5.7'	sand & gravel	NA	NA	36	to	41.7	731.1	to	725.4
US6I	7/10/87	2115380.91	1051520.35	767.6	770.21	62.76'	stainless	3.7'	CL	55.00	712.60	59.06	to	62.76	708.54	to	704.84
US6D	7/6/87	2115387.72	1051523.28	767.1	770.09	83.17'	stainless	5.7'	sand & gravel	74.50	692.60	77.47	to	83.17	689.63	to	683.93
US7S	7/16/87	2116603.79	1051803.25	764.4	767.99	32.63'	stainless	5.7'	Interbedded Cl+GP	25.00	739.40	26.93	to	32.63	737.47	to	731.77
TSC Wells																	
GI1S	NA	2116538.48	1050747.65	767.6	770.12	NA	NA	NA	fine to coarse sand	NA	NA	NA		NA	NA		NA
GI1D	NA	2116541.35	1050747.19	767.1	769.99	NA	NA	NA	organic silty clay	NA	NA	NA		NA	NA		NA
GI4S	5/7/74	2115621.98	1053289.24	767.6	770.34	10	NA	NA	clayey sand	NA	NA	NA		NA	NA		NA
GI4D	5/7/74	2115619.37	1053288.07	767.7	769.75	34	NA	NA	silty sand	NA	NA	NA		NA	NA		NA
GI02	5/8/74	2115417.06	1050750.06	771.1	773.53	25	NA	NA	f-c sand	NA	NA	NA		NA	NA		NA
RI03	10/31/85	2115400.27	1051520.55	767.6	769.55	27	pvc	5	f-c sand tr. gravel	17.7	NA	21	to	27	746.6	to	740.6
TSC Leachate Wells																	
LP1	5/19/83	1+80S	13+35W	797.73	N/A	45	PVC	30	Fill and Refuse	4.5	792.8	13	to	43	784.3	to	754.3
LP8	5/20/83	6+50S	5+00W	796.23	N/A	43.5	PVC	30	Fill and Refuse	4	792.93	13	to	43	783.93	to	753.93
LP9	5/20/83	6+50S	10+00W	795.06	N/A	43.5	PVC	30	Fill and Refuse	4	791.06	13	to	43	782.06	to	752.06
LP10	5/23/83	7+50S	14+50W	795.06	N/A	45	PVC	30	Fill and Refuse	4	791.06	13	to	43	782.06	to	752.06
P2A	9/18/84	1+80S	10+00W	795.1	797.6	75	PVC	65	Fill and Refuse	4.5	790.06	6.6	to	71.6	788.5	to	723.5
P3A	9/21/84	1+80S	5+05W	792.4	794.7	75	PVC	65	Fill and Refuse	5	787.4	7.7	to	72.7	784.7	to	719.7
Warzyn Wells																	
W2D	4/20/93	2116648.18	1052499.88	770.7	773.04	88.33'	pvc	5'	f-c sand	79.80	690.90	83.3	to	88.3	687.4	to	692.4
W3SA	4/7/93	2115185.28	1051029.19	763.8	766.54	15.64'	pvc	10.09'	f-c sand	5.00	758.80	5.55	to	15.64	758.25	to	748.16
W3SB	4/7/93	2115189.39	1051027.83	763.7	766.81	29.57'	pvc	5'	sand over. clay	22.55	741.15	24.55	to	29.57	739.1	to	734.13

TABLE I-5
SUMMARY OF MONITORING WELL CONSTRUCTION DETAILS
H.O.D. LANDFILL
ANTIOCH, ILLINOIS

Well #	Completion Date	Coordinates		Ground Elev	TOIC Elev	Total Depth	Well/Screen Materials	Screen Length	Stratigraphy at Screen	Top of Sand Pack		Screen Interval			Screen Interval		
		North	East							Depth	Elev	Depth			Elevation		
W3D	5/25/93	2115187.6	1051022.66	763.73	765.93	78'	pvc	5'	f-c sand	70.90	692.83	73.3	to	77.6	690.43	to	686.13
W4S	5/26/93	2115201.97	1050628.33	767.5	769.97	15'	pvc	10'	f-c sand	4.00	763.50	5	to	15	762.5	to	752.5
W5S	4/21/93	2115375.15	1050760.47	771.1	773.49	14.34'	pvc	10.46'	f-c sand	3.90	767.20	5.22	to	14.34	765.88	to	756.76
W6S	4/16/93	2115399.38	1051541.09	764.9	767.41	15'	pvc	9.18'	f-c sand	4.00	760.90	5.82	to	15	759.08	to	749.9
W7D	4/14/93	2116325.98	1053153.28	780.2	782.87	99.72'	pvc	4.3'	f-c sand	93.00	687.20	95.42	to	99.72	684.8	to	680.48
W8D	3/21/93	2115325.82	1052660.77	766.68	768.14	94'	pvc	5'	f-c sand	76.60	690.08	89	to	94	677.68	to	672.68
PELA Piezometers																	
PZ1	8/10/89	2116820.66	1053361.37	786.2	788.48	118.2'	stainless	10'	clay over sand	102.00	684.20	108.2	to	118.2	678.2	to	668
PZ1U	2/28/90	2115026.24	1051398.67	763.9	766.41	27'	pvc	20'	sand	5.50	758.40	7	to	27	756.9	to	736.9
PZ2U	3/1/90	2114903.68	1050856.51	764.1	768.04	16.5'	pvc	10'	sand	5.00	759.10	6.5	to	16.5	757.6	to	747.6
PZ3U	3/5/90	2115540.75	1051908.41	763.4	766.27	37'	pvc	30'	sand	5.00	758.40	7	to	37	756.4	to	726.4
PZ4U	3/6/90	2115619.7	1052359.45	763.3	766.49	27'	pvc	20'	sand & gravel	6.00	757.30	7	to	27	756.3	to	736.3
PZ5U	3/7/90	2115771.83	1053088.12	769.3	771.11	32'	pvc	20'	sand	10.00	759.30	12	to	32	757.3	to	737.3
PZ6U	4/26/90	2115818.07	1052491.73	763.6	766.54	42.5'	pvc	10'	sand & gravel	23.00	740.60	32.5	to	42.5	731.1	to	721.1
PELA Sequoit Creek Piezometers																	
SC-1A	3/4/90	2115370.25	1052636.44	764.7	766.84	13.2	1.25" Galvan.	5	silt/f-med. sand	5.00	759.70	8.2	to	13.2	756.5	to	751.5
SC-1B	3/2/90	2115325.82	1052637.67	766.4	769.34	23.69	1.25" PVC	10	silt/f-med. sand	7.50	758.90	13.69	to	23.69	752.7	to	742.71
SC-1C	2/28/90	2115254.06	1052641.84	762.9	765.44	15.55	1.25" PVC	5	silt/f-med. sand	10.80	752.10	10.55	to	15.55	752.3	to	743.14
SC-1D	2/28/90	2115231.17	1052643.06	762.94	766.39	19.8	1.25" PVC	5	f-v. coarse sand	13.90	749.04	14.8	to	19.8	748.14	to	
SC-2A	3/1/90	2115338.69	1051601.5	763.2	765.09	11.1	1.25" PVC	5	silt/f-coarse sand	5.70	757.50	6.1	to	11.1	757.1	to	752.1
SC-2B	3/1/90	2115316.07	1051603.37	766	767.24	19.1	1.25" PVC	5	f-coarse sand	3.37	762.63	14.1	to	19.1	751.9	to	746.9
SC-2C	2/22/90	2115260.1	1051600.09	763.2	764.51	14.9	1.25" Galvan.	5.9	silt/f-c sand	8.75	754.45	9	to	14.9	754.2	to	748.3
SC-2D	2/23/90	2115241.45	1051600.63	763.4	764.77	13.7	1.25" Galvan.	5	Cl/f-c sand	9.00	754.40	8.7	to	13.7	754.7	to	749.7
SC-3B	3/7/90	2115369.02	1050754.32	769.9	770.6	16.9	1.25" Galvan.	5	f-c sand	8.46	761.44	11.9	to	16.9	758	to	753
SC-3C	3/20/90	2115358.14	1050690.91	767.7	770.26	15.5	1.25" Galvan.	5	f-c sand/gravel	7.00	760.70	10.5	to	15.5	757.2	to	752.2
SC-3D	3/20/90	2115359.75	1050673.05	767.1	769.77	15.5	1.25" Galvan.	5	silt/f-c sand	8.00	759.10	10.5	to	15.5	756.6	to	751.6
SC-4A	3/7/90	2116552.59	1050772.28	768.8	770.22	27.5	1.25 " PVC	10	silty clay	15.00	753.80	17.5	to	27.5	751.3	to	741.3
SC-4B	3/6/90	2116550.92	1050752.8	768.1	770.44	27.89	1.25 " PVC	10	clayey silt	17.44	750.66	17.89	to	27.89	750.2	to	740.21
SC-4C	3/5/90	2116539.91	1050689.83	765.8	768.53	17.3	1.25 " PVC	10	silt/fine sand	3.20	762.60	7.3	to	17.3	758.5	to	748.5
SC-4D	3/19/90	2116551.85	1050676.6	766.3	769.6	22	1.25 " PVC	10	silt/gravel	7.00	759.30	12	to	22	754.3	to	744.3

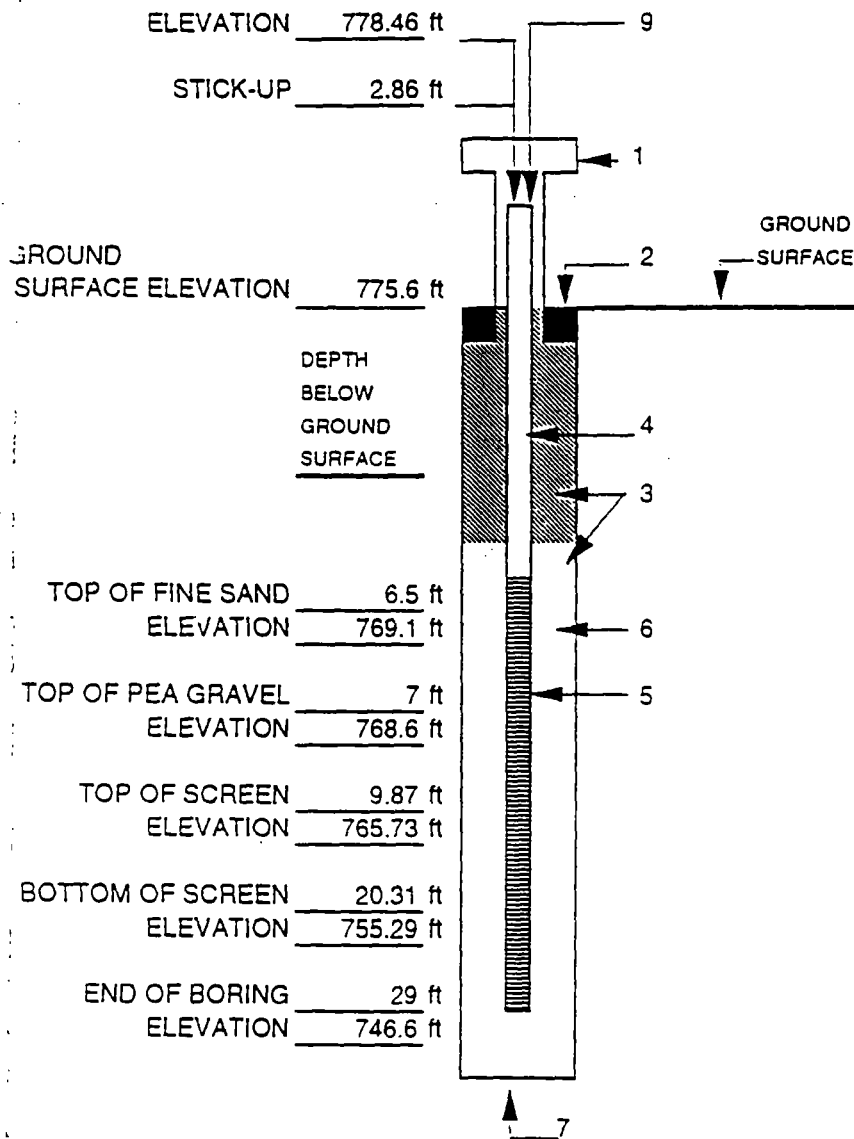
TABLE 1-5
SUMMARY OF MONITORING WELL CONSTRUCTION DETAILS
H.O.D. LANDFILL
ANTIOCH, ILLINOIS

Well #	Completion Date	Coordinates		Ground Elev	TOIC Elev	Total Depth	Well/Screen Materials	Screen Length	Stratigraphy at Screen	Top of Sand Pack		Screen Interval			Screen Interval		
		North	East							Depth	Elev		Depth			Elevation	
Warzyn Gas Probes																	
GP3	4/21/93	2116615.46	1052220.9	770.8	773.51	20	2" PVC	14.82	silty clay	3.6	767.2	5.03	to	19.85	765.77	to	750.95
GP4A	4/15/93	2116248.07	1053013.74	776.4	778.87	26	2" PVC	20.2	silty clay	5	771.4	5.8	to	26	770.6	to	750.4
GP5A	4/22/93	2115682.26	1051583.29	768.4	770.8	16.1	2" PVC	10.1	silty clay	6	762.6	6	to	16.1	762.4	to	752.3
Warzyn Leachate Piezometers																	
LP1	4/27/93	2116410.72	1050909.73	775.6	778.46	20.31	6" PVC	10.44	fill and refuse	7	768.6	9.87	to	20.31	765.73	to	755.29
LP2	4/30/93	2116428.68	1051349.01	785.5	787.8	35	6" PVC	25.3	fill and refuse	8.5	777	9.7	to	35	775.8	to	750.5
LP3	4/28/93	2116082.67	1050918.94	778.1	780.89	22.5	6" PVC	14.5	fill and refuse	9	769.1	11	to	25.5	767.1	to	752.6
LP4	5/4/93	2116110.56	1051338.6	788.9	790.84	39	6" PVC	29.1	fill and refuse	8.6	780.3	9.9	to	39	779	to	749.9
LP5	4/21/93	2116229.99	1051719.62	796.6	800.13	50	6" PVC	39.5	fill and refuse	9	787.6	10.5	to	50	786.1	to	746.6
LP6	4/16/93	2115990.18	1051732.08	794.6	797.32	36.5	6" PVC	26.8	fill and refuse	8	786.6	9.7	to	36.5	784.9	to	758.1
LP7	4/28/93	2116197.77	1052105.4	794.7	797.39	61	6" PVC	51.5	fill and refuse	8.5	786.2	9.5	to	61	785.2	to	733.7
LP8	4/27/93	2116218.62	1052519.39	793.5	796.35	70	6" PVC	60	fill and refuse	9	784.5	10	to	70	783.5	to	723.5
LP9	4/23/93	2116220.42	1052769.86	785.8	789.16	66.5	6" PVC	57.3	fill and refuse	8.5	777.3	9.2	to	66.5	776.6	to	719.3
LP10	4/27/93	2115810.43	1050919.77	781.1	783.92	23	6" PVC	13.5	fill and refuse	8.3	772.8	9.5	to	23	771.6	to	758.1
LP11	4/12/93	2115807.09	1051321.81	787.8	790.61	29.2	6" PVC	21.7	fill and refuse	7.5	780.3	9.3	to	29.2	778.5	to	758.6
LP12	4/8/93	2115515.46	1051138.39	782.6	784.85	22.5	6" PVC	12.5	fill and refuse	8	774.6	10	to	22.5	772.6	to	760.1
LP13	4/13/93	2115448.41	1050899.85	779	781.68	17	6" PVC	7.17	fill and refuse	9	770	9.83	to	17	769.17	to	762
LP14	4/13/93	2115474.47	1051389.52	781.7	784.27	22.5	6" PVC	12.3	fill and refuse	8.9	772.8	10.2	to	22.5	771.5	to	759.2
Kelletts Well Boring, Inc.																	
GWF1	6/23/88	2+63S	17+75W	795	798	42	8" PVC	22	fill and refuse	14	781	20	to	42	773	to	751
GWF2	6/22/88	2+28S	14+86W	796.2	799.2	47	8" PVC	27	fill and refuse	17	779.2	20	to	47	776.2	to	749.2
GWF3	6/22/88	2+32S	11+49W	797.2	800.2	45	8" PVC	25	fill and refuse	17	780.2	20	to	45	777.2	to	752.2
GWF4	6/22/88	2+27S	8+55W	795	798	45	8" PVC	25	fill and refuse	17	778	20	to	45	775	to	750
GWF5	6/22/88	2+11S	5+37W	789.2	792.2	55	8" PVC	35	fill and refuse	17	772.2	20	to	55	769.2	to	734.2
GWF6	6/23/88	3+78S	7+47W	791.2	794.2	41	8" PVC	21	fill and refuse	17	774.2	20	to	41	771.2	to	750.2
GWF7	6/24/88	3+90S	10+70W	795.9	798.9	48	8" PVC	28	fill and refuse	17	778.9	20	to	48	775.9	to	747.9
GWF8	6/24/88	4+46S	14+50W	797.4	800.4	48	8" PVC	28	fill and refuse	17	780.4	20	to	48	777.4	to	749.4
GWF9	6/25/88	4+94S	16+72W	797	800	47	8" PVC	27	fill and refuse	17	780	20	to	47	777	to	750
GWF10	6/25/88	6+87S	17+59W	792.7	795.7	38	8" PVC	18	fill and refuse	17	775.7	20	to	38	772.7	to	754.7
GWF11	6/24/88	6+69S	15+85W	793.6	796.6	40	8" PVC	20	fill and refuse	17	776.6	20	to	40	773.6	to	753.6
GWF12	6/24/88	6+20S	12+93W	792.5	795.5	22	8" PVC	10	fill and refuse	10	782.5	12	to	22	780.5	to	770.5



LEACHATE PIEZOMETER DETAIL LEACHATE PIEZOMETER NO. LP1

Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 4/28/93
Contractor E & F
Coordinates 2116410.7N, 1050909.7 E



1. LOCKING STEEL PROTECTIVE CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYDRATED CHIPS
CONCRETE
3. HYDRATED BENTONITE
CHIPS, AND FINE SILICA SAND
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 10.44 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
BENTONITE CHIPS
8. BOREHOLE
DIAMETER 14 IN
9. PROBE TOP VENTED SLIP CAP

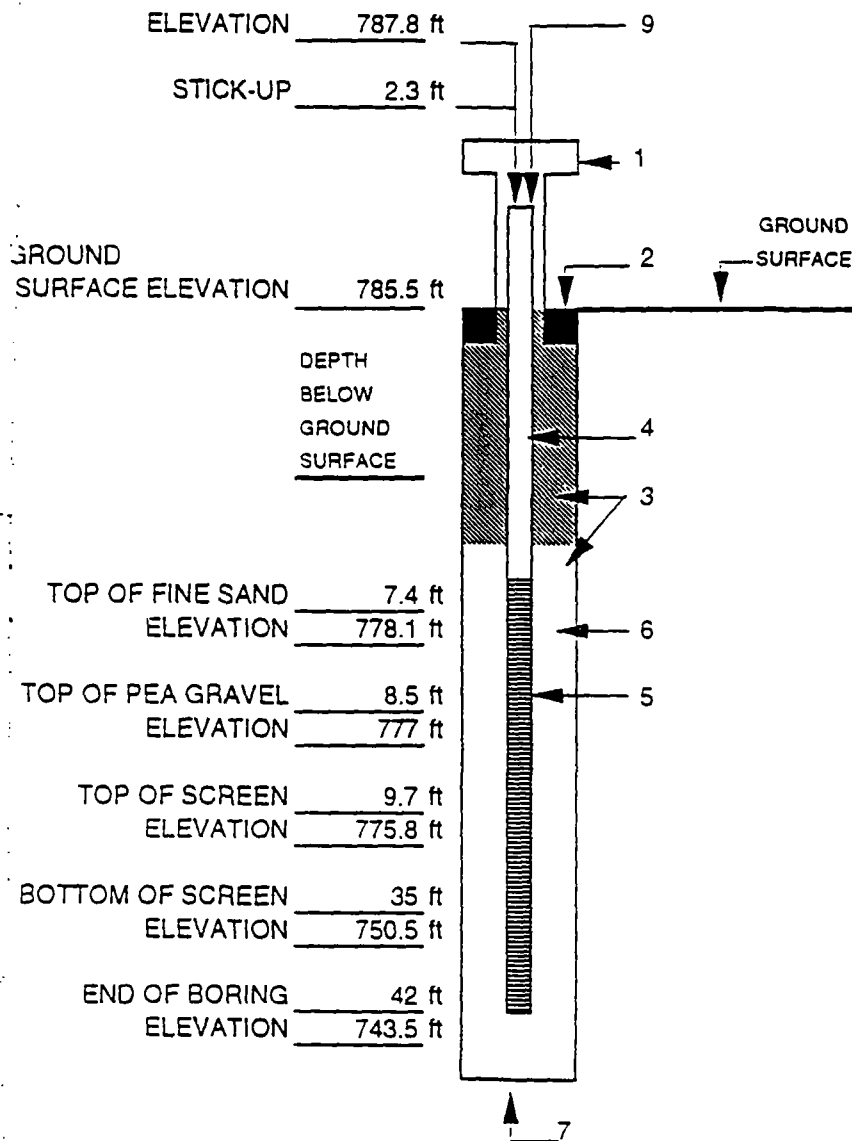
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1/10010201/LP1.XLS



LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP2



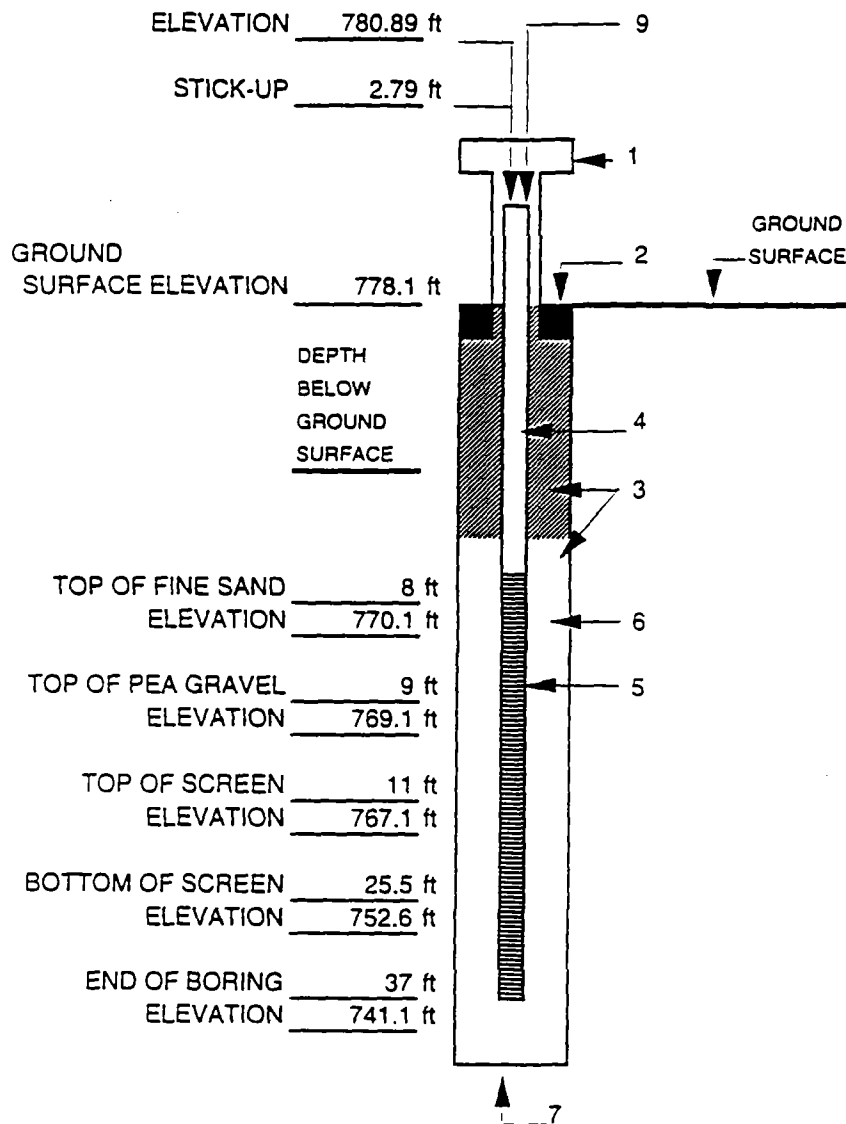
Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 4/30/93
Contractor E & F
Coordinates 2116428.7N, 1051349E

1. LOCKING STEEL PROTECTIVE CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYDRATED GRANULAR/CHIPS
CONCRETE
3. HYDRATED BENTONITE
GRANULAR/CHIPS, FINE SILICA SAND
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 25.3 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
BENTONITE CHIPS/PEA GRAVEL
8. BOREHOLE
DIAMETER 14 IN
9. PROBE TOP VENTED SLIP CAP



LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP3



Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 4/29/93
Contractor E & F
Coordinates 2116428.7N, 1050918.9E

1. LOCKING STEEL PROTECTIVE CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYDRATED CHIPS
CONCRETE
3. HYDRATED BENTONITE
CHIPS, FINE SILICA SAND
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 14.5 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
BENTONITE CHIPS/PEA GRAVEL
8. BOREHOLE
DIAMETER 14 IN
9. PROBE TOP VENTED SLIP CAP

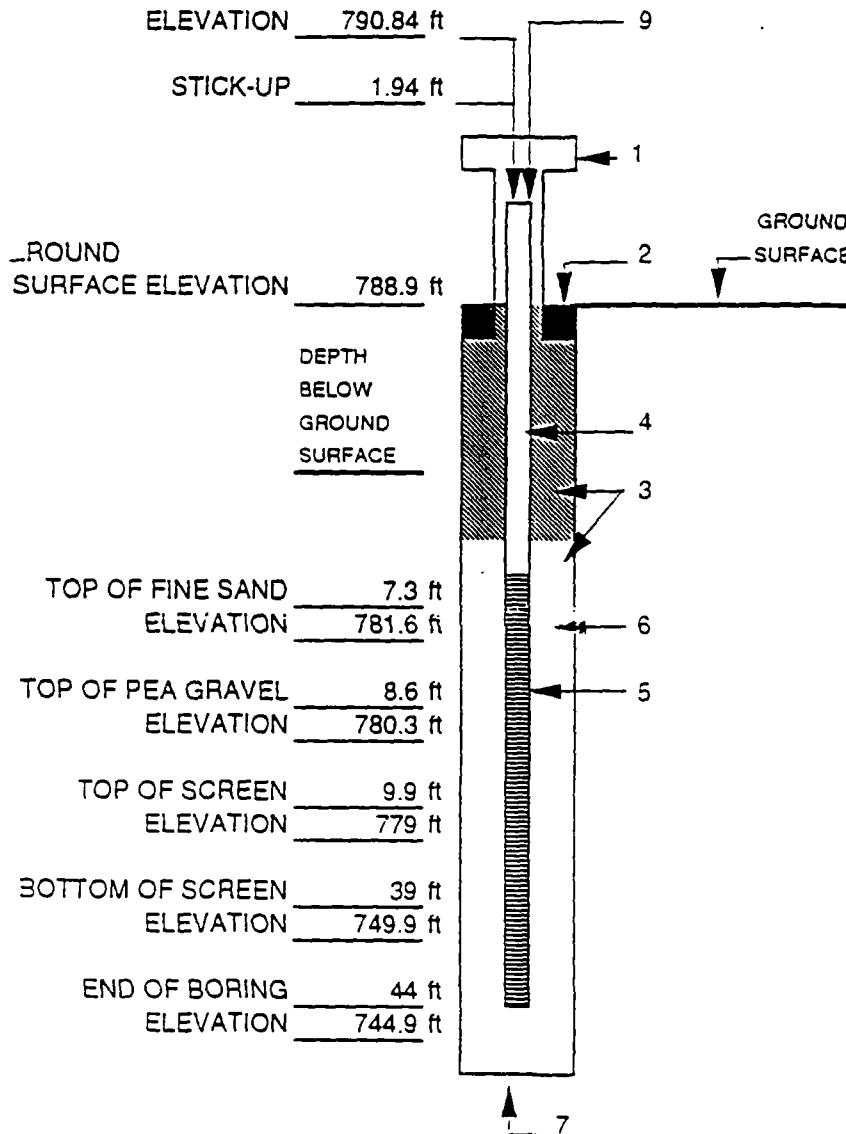
SJC/jrs/DAP

J:10010201/LP3.XLS



LEACHATE PIEZOMETER DETAIL LEACHATE PIEZOMETER NO. LP4

Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 5/4/93
Contractor E & F
Coordinates 2116110.6N, 1051338.6E



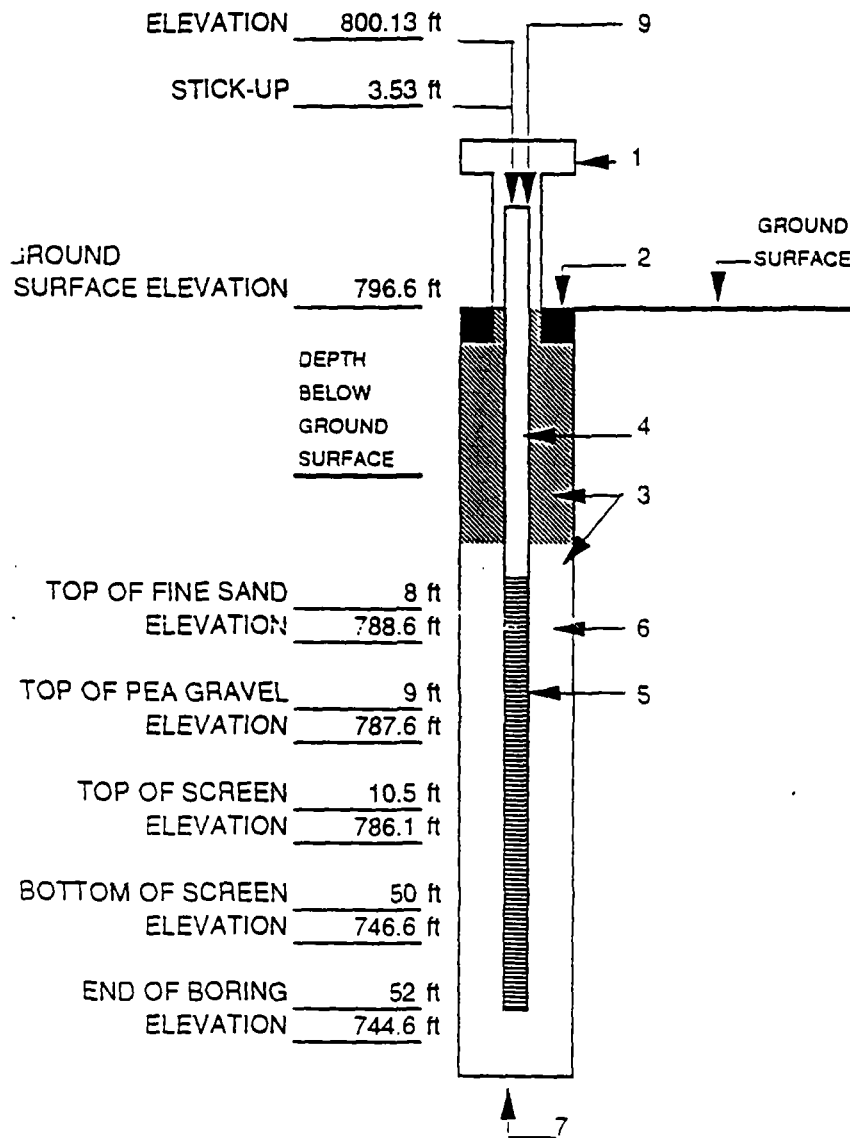
1. LOCKING STEEL PROTECTIVE-CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYD. CHIPS/GRANULAR CONCRETE
3. HYDRATED BENTONITE
CHIPS/GRANULAR, FINE SILICA SAND
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 29.1 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
BENTONITE CHIPS, PEA GRAVEL
8. BOREHOLE
DIAMETER 14 IN
9. PROBE TOP VENTED SLIP CAP



LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP5

Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 4/21/93
Contractor E & F
Coordinates 2116230N, 1051719.6E



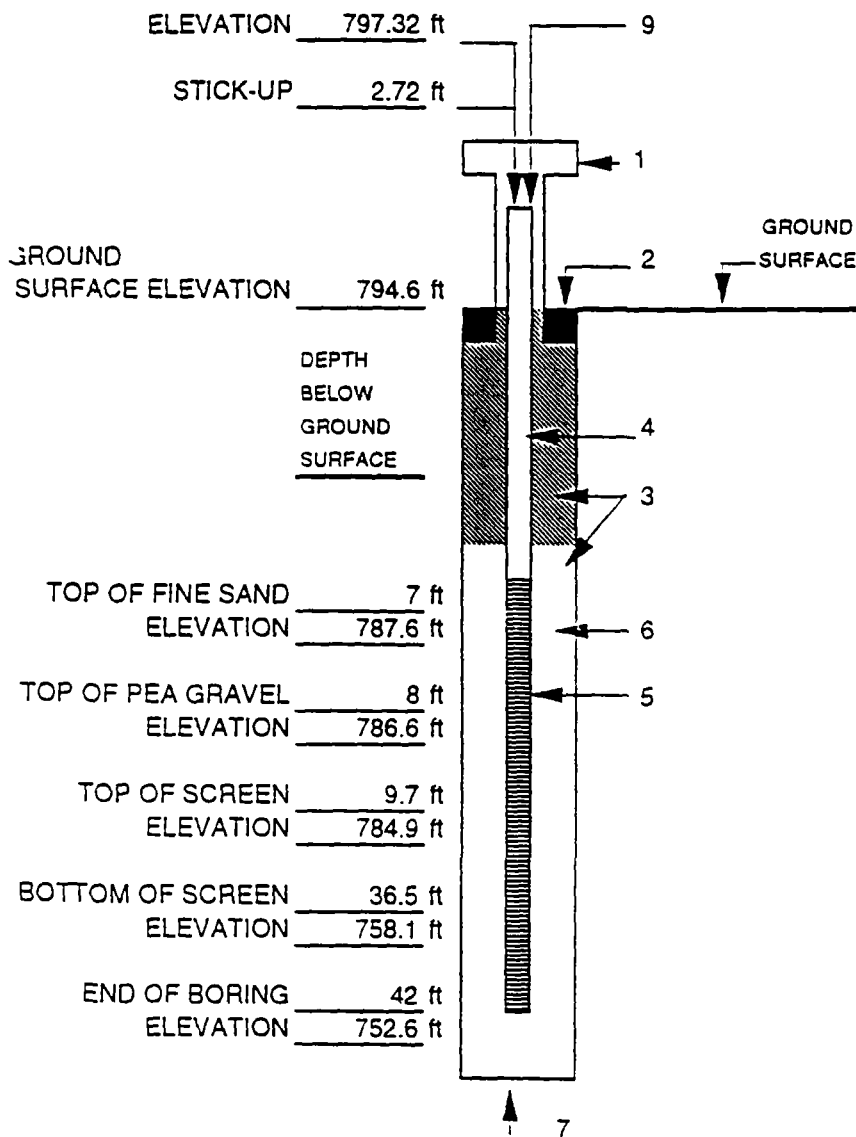
1. LOCKING STEEL PROTECTIVE CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYD. CHIPS/GRANULAR
CONCRETE
3. HYDRATED BENTONITE
CHIPS/GRANULAR
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 39.5 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
BENTONITE CHIPS, PEA GRAVEL
8. BOREHOLE
DIAMETER 14 IN
9. PROBE TOP VENTED SLIP CAP



LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP6

Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 4/16/93
Contractor E & F
Coordinates 2115990.2N, 1051732.1E



1. LOCKING STEEL PROTECTIVE CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYD. CHIPS/GRANULAR CONCRETE
3. HYDRATED BENTONITE
CHIPS/GRANULAR, FINE SILICA SAND
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 26.8 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
WASHED PEA GRAVEL
8. BOREHOLE
DIAMETER 14 IN
9. PROBE TOP VENTED SLIP CAP

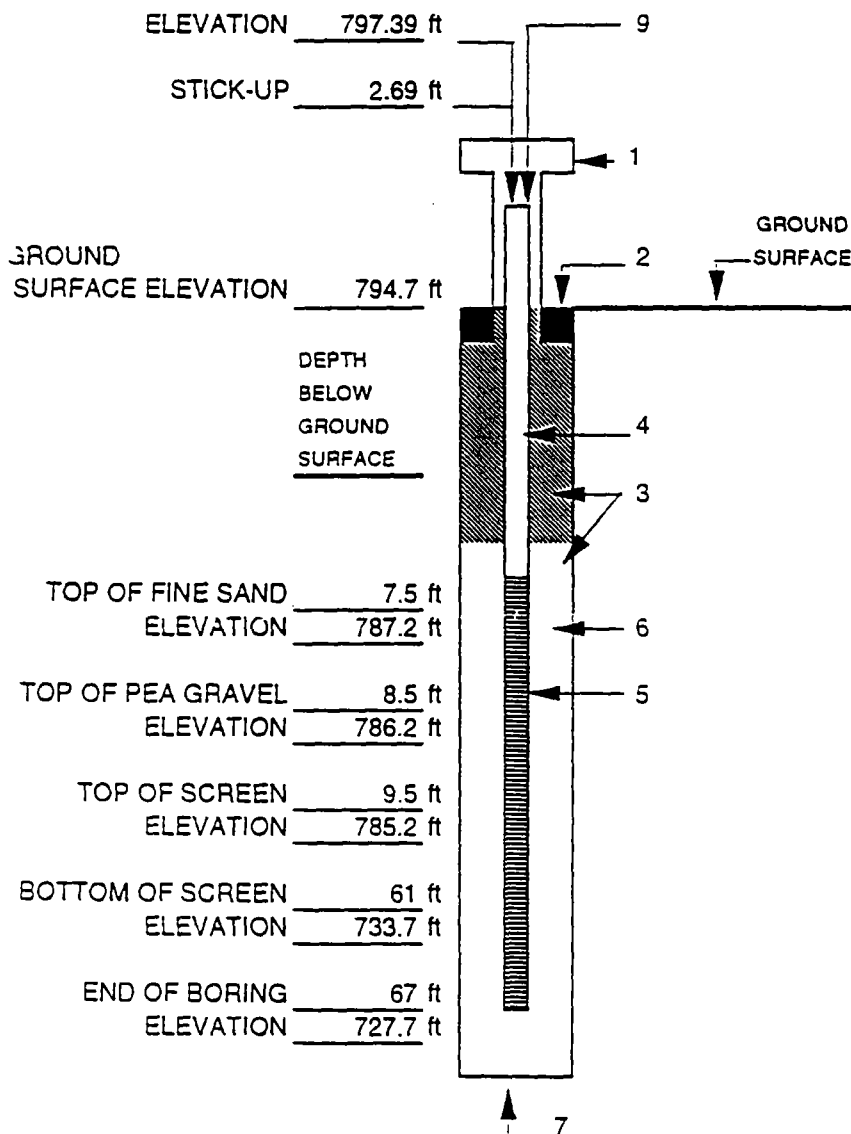
SJC/jrs/DAJ

1/10010201/LP6XLS



LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP7



Project HOD LANDFILL
Location ANTIOCH, LANDFILL
Job No. 10010201
Date Constructed 4/29/93
Contractor E & F
Coordinates 2116197.8N, 1052105.4E

1. LOCKING STEEL PROTECTIVE CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYD. GRANULAR/CHIPS
CONCRETE
3. HYDRATED BENTONITE
GRANULAR/CHIPS, FINE SILICA SAND
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 51.5 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
BETNONITE CHIPS/PEA GRAVEL
8. BOREHOLE
DIAMETER 14 IN
9. PROBE TOP VENTED SLIP CAP

SIC/jrm/D-AP

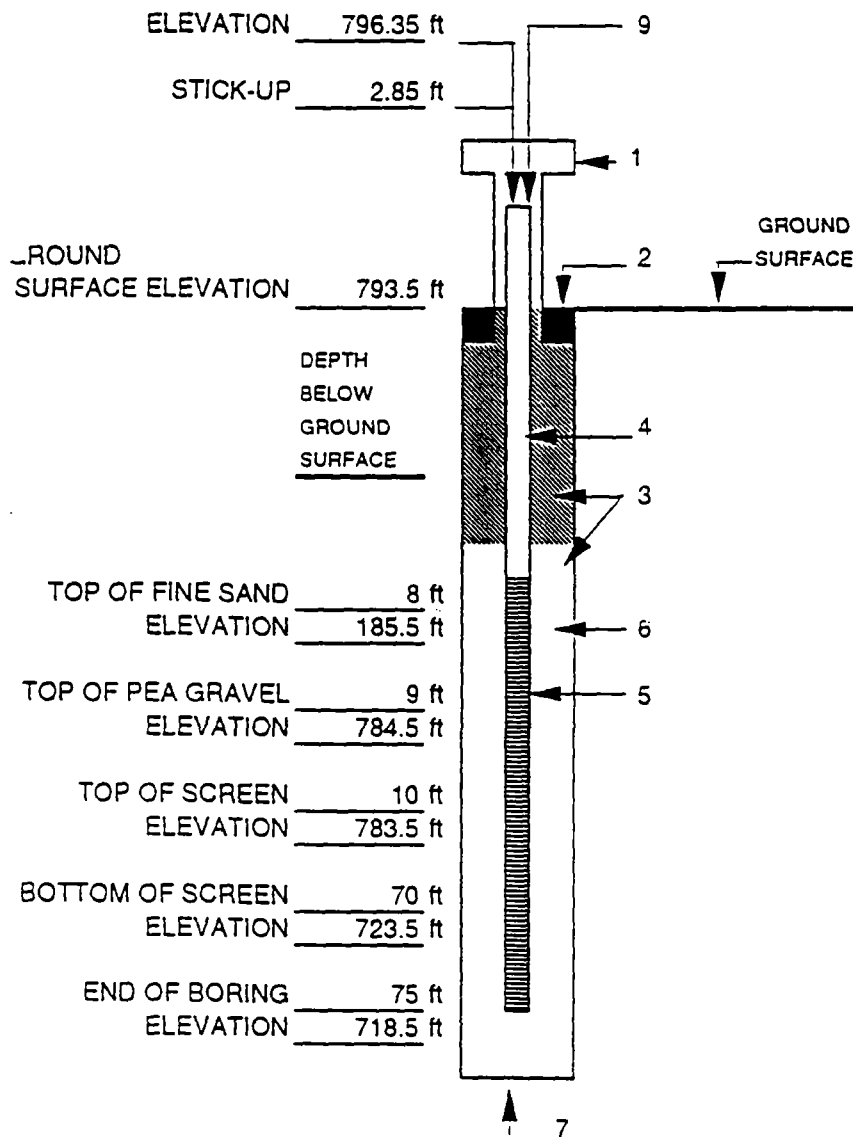
J/10010201/LP7.XLS



LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP8

Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 4/27/93
Contractor E & F
Coordinates 2116218.6N, 1052519.4E

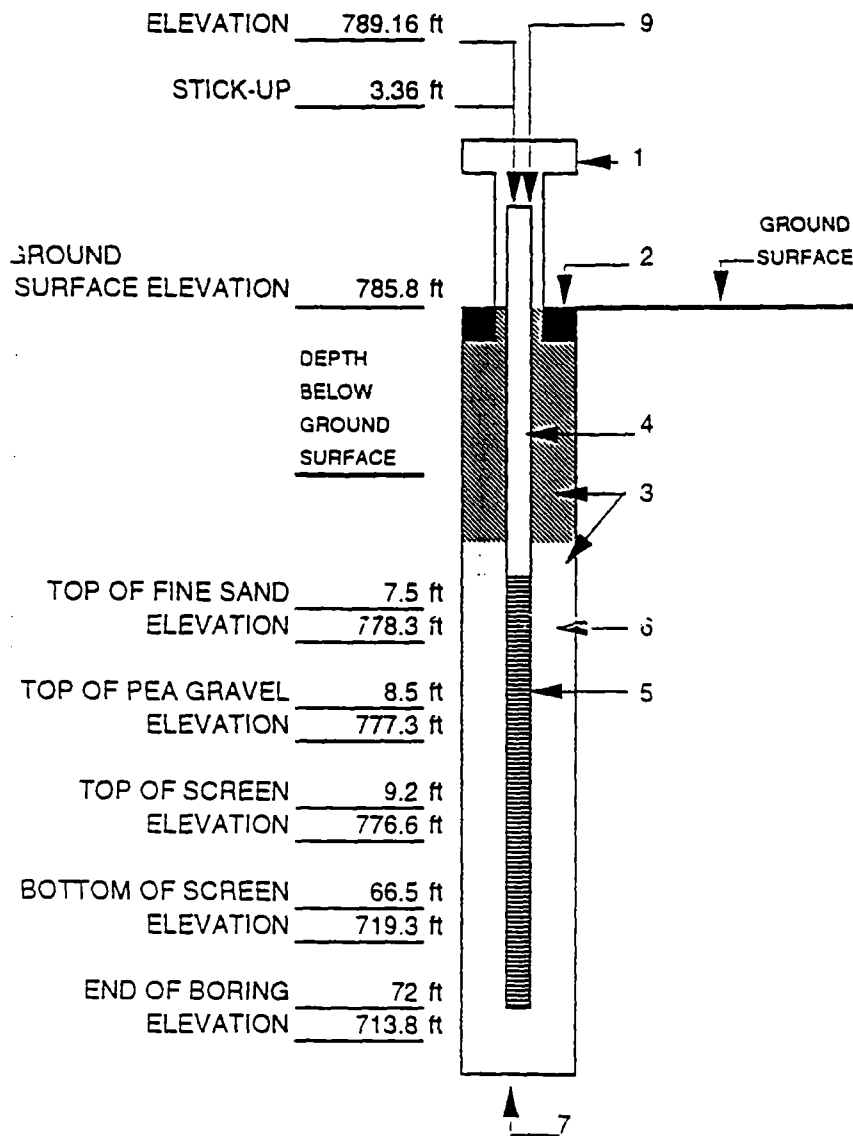


1. LOCKING STEEL PROTECTIVE CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYD. CHIPS/GRANULAR CONCRETE
3. HYDRATED BENTONITE
CHIPS/GRANULAR, FINE SILICA SAND
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 60 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
BENTONITE CHIPS, PEA GRAVEL
8. BOREHOLE
DIAMETER 14 IN
9. PROBE TOP VENTED SLIP CAP



LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP9



Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 4/23/93
Contractor E & F
Coordinates 2116220.4N, 1052769.9E

1. LOCKING STEEL PROTECTIVE CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYD CHIPS/GRANULAR
CONCRETE
3. HYDRATED BENTONITE
CHIPS/GRANULAR, FINE SILICA SAND
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 57.3 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
BENTONITE CHIPS THEN PEA GRAVEL
8. BOREHOLE
DIAMETER 14 IN
9. PROBE TOP VENTED SLIP CAP

SIC/jrs/D.A.F.

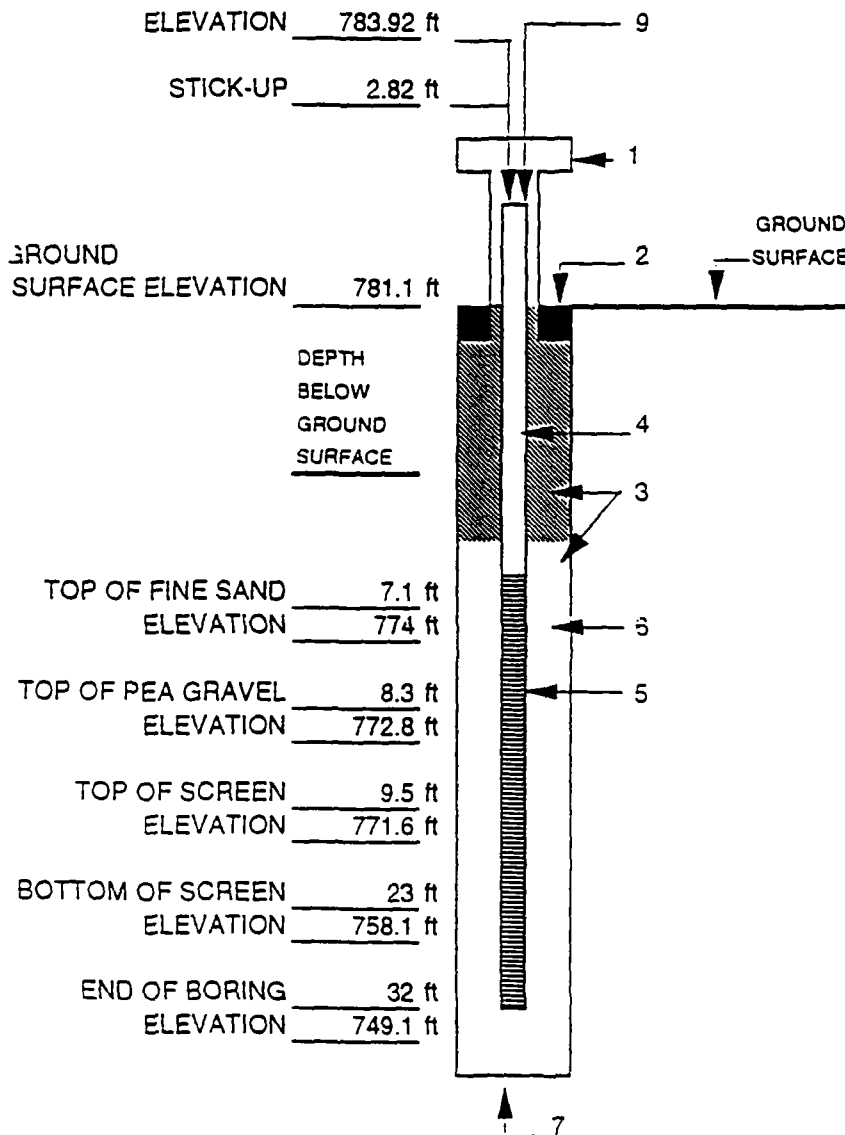
J:\10010201\LP9.XLS



LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP10

Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 4/30/93
Contractor E & F
Coordinates 2115810.4N, 1050919.8E



1. LOCKING STEEL PROTECTIVE CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYD. GRANULAR/CHIPS
CONCRETE
3. HYDRATED BENTONITE
GRANULAR/CHIPS, AND FINE SILICA SAND
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 13.5 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
BENTONITE CHIPS
8. BOREHOLE
DIAMETER 14 IN
9. PROBE TOP VENTED SLIP CAP

SJC/jrs/DAP

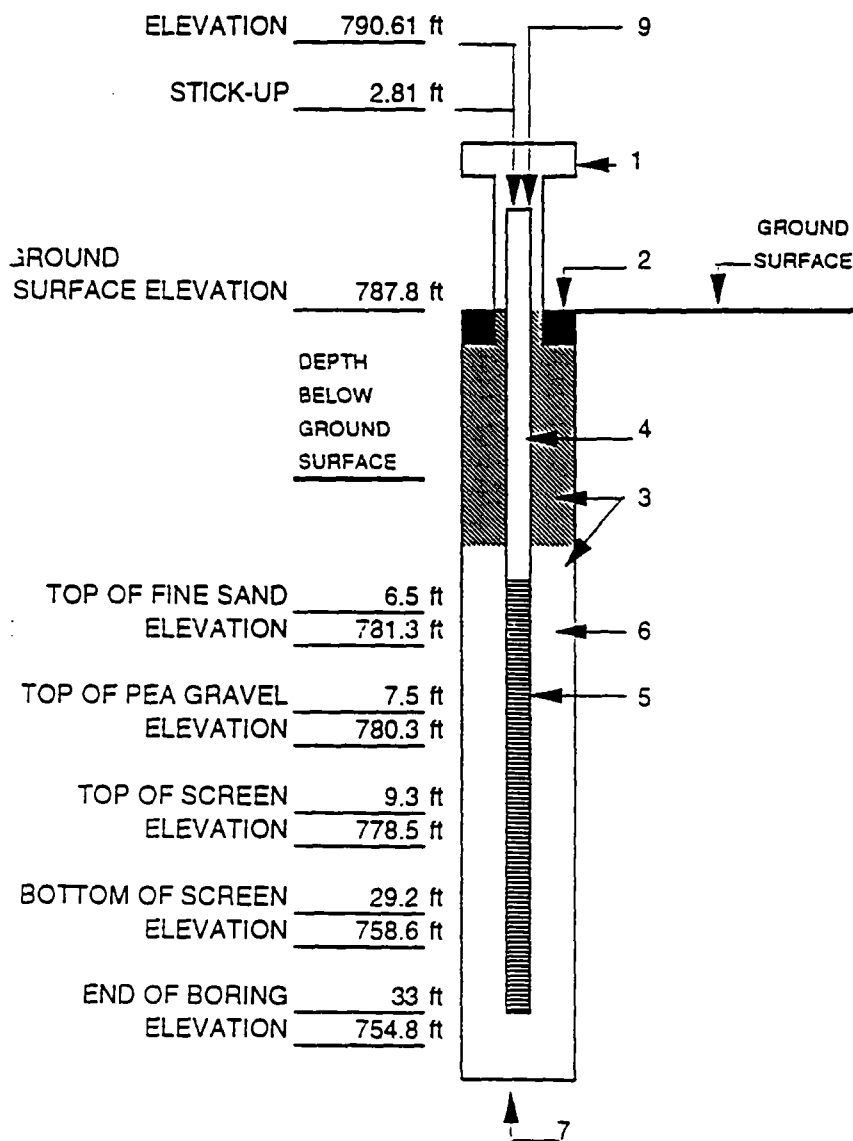
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LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP11

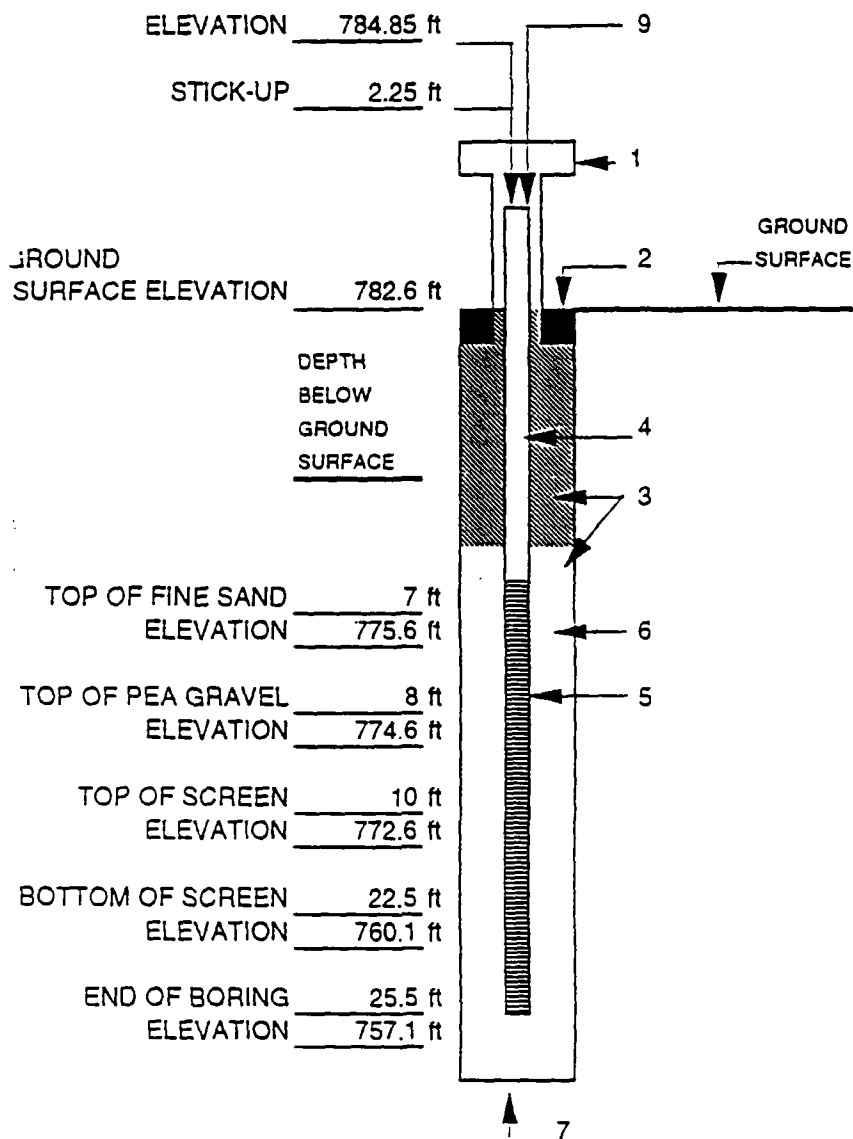
Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 4/12/93
Contractor E & F
Coordinates 2115807.1N, 1051321.8E





LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP12



Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 4/8/93
Contractor E & F
Coordinates 2115515.5N, 1051138.4E

1. LOCKING STEEL PROTECTIVE CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYD. GRANULAR/CHIPS
CONCRETE
3. HYDRATED BENTONITE
GRANULAR/CHIPS, AND FINE SILICA SAND
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 12.5 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
WASHED PEA GRAVEL
8. BOREHOLE
DIAMETER 14 IN
9. PROBE TOP VENTED SLIP CAP

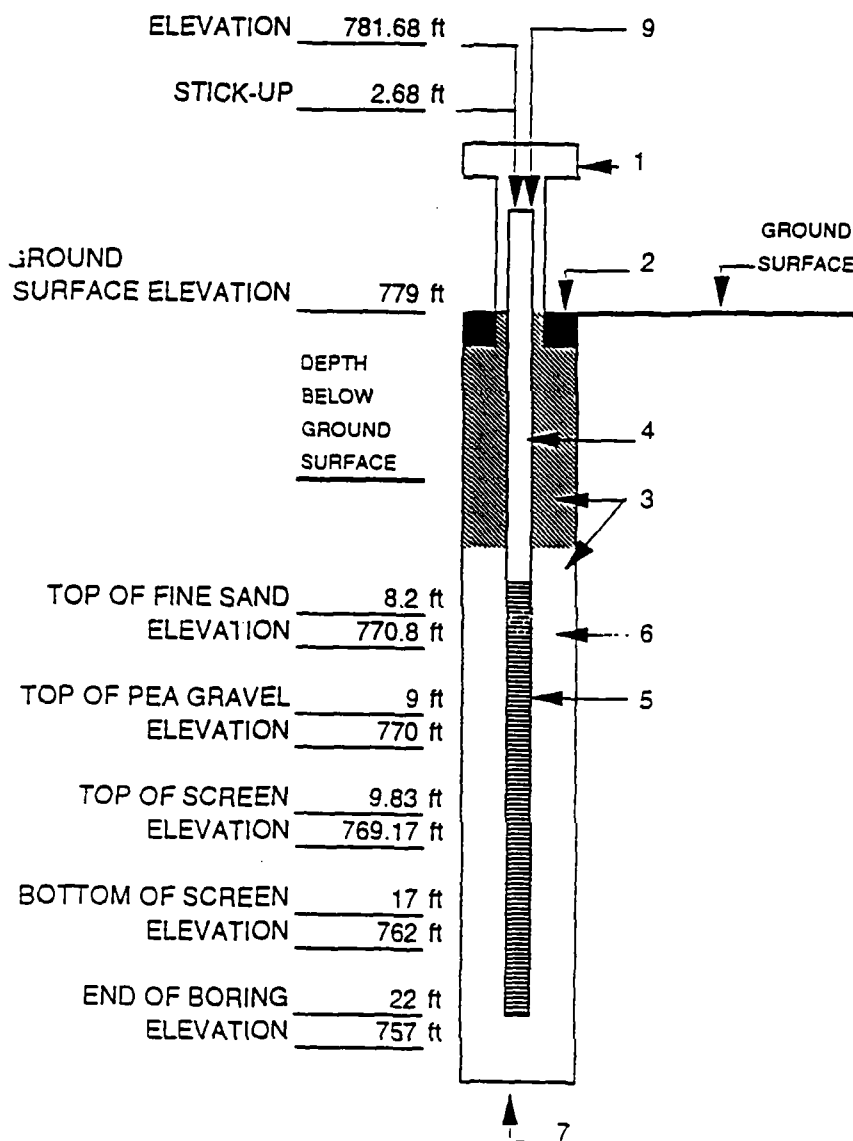
SJC/jms/DAP

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LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP13



Project HOD LANDFILL
Location ANTIOCH, ILLINOIS
Job No. 10010201
Date Constructed 4/13/93
Contractor E & F
Coordinates 2115448.4N, 1050899.8E

1. LOCKING STEEL PROTECTIVE CASING
DIAMETER 8 IN
LENGTH 7 FT
2. SURFACE SEAL
BENTONITE HYD. CHIPS/GRANULAR CONCRETE
3. HYDRATED BENTONITE
GRANULAR/CHIPS, FINE SILICA SAND
4. PVC PIPE
DIAMETER 6 IN ID
SCHEDULE 80 PVC
5. SLOTTED PVC SCREEN
DIAMETER 6 IN ID
SCHEDULE 80 PVC
SLOT SIZE 0.020 IN
LENGTH 7.17 FT
6. PEA GRAVEL WASHED
7. BORING BACKFILL TO SCREEN BOTTOM
WASHED PEA GRAVEL
8. BOREHOLE DIAMETER 14 IN
9. PROBE TOP Vented Slip Cap

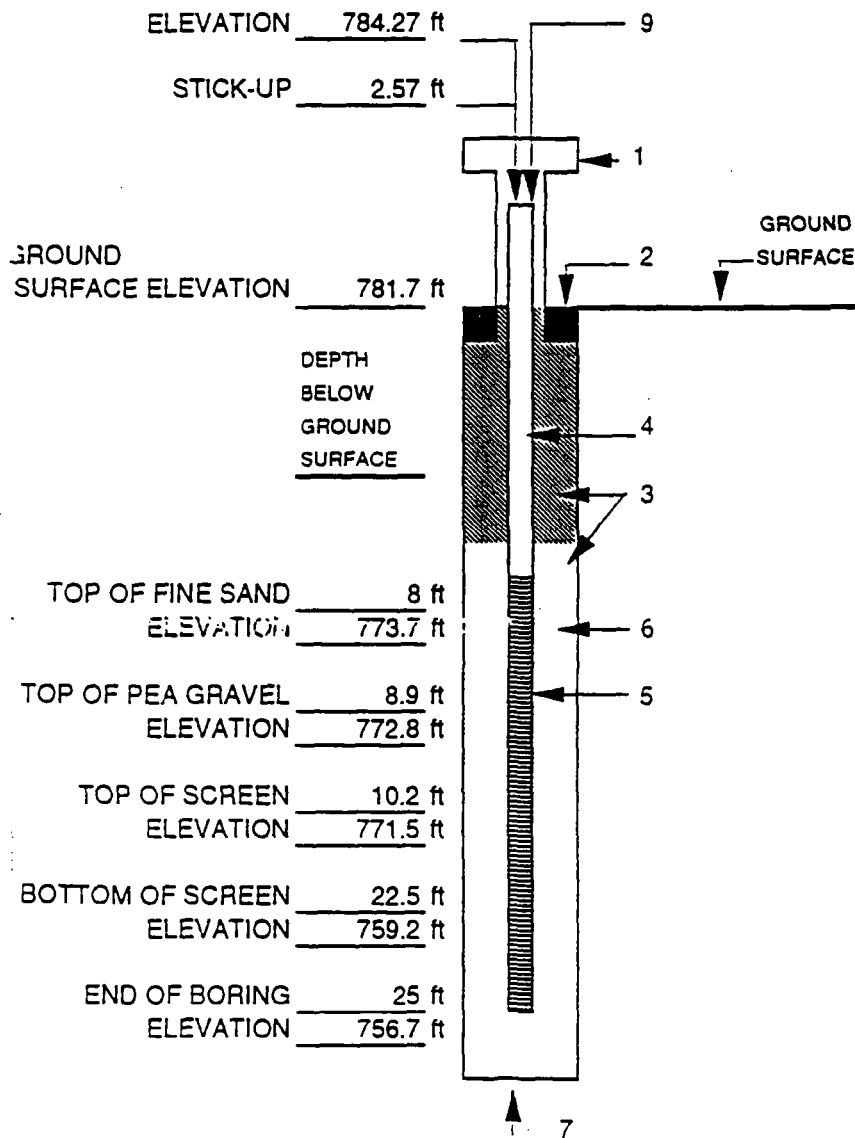
SJC/jrs/DAJ

1/10010201/LP13.SL



LEACHATE PIEZOMETER DETAIL

LEACHATE PIEZOMETER NO. LP14



Project	HOD LANDFILL
Location	ANTIOCH, ILLINOIS
Job No.	10010201
Date Constructed	4/14/93
Contractor	E & F
Coordinates	2115474.5N, 1051389.5E

1. LOCKING STEEL PROTECTIVE CASING

DIAMETER	8 IN
LENGTH	7 FT

2. SURFACE SEAL

BENTONITE	HYD. CHIPS/GRANULAR
CONCRETE	

3. HYDRATED BENTONITE

CHIPS/GRANULAR, FINE SILICA SAND	
----------------------------------	--

4. PVC PIPE

DIAMETER	6 IN ID
SCHEDULE	80 PVC

5. SLOTTED PVC SCREEN

DIAMETER	6 IN ID
SCHEDULE	80 PVC
SLOT SIZE	0.020 IN
LENGTH	12.3 FT

6. PEA GRAVEL

WASHED	
--------	--

7. BORING BACKFILL TO SCREEN BOTTOM

WASHED PEA GRAVEL	
-------------------	--

8. BOREHOLE

DIAMETER	14 IN
----------	-------

9. PROBE TOP

VENTED SLIP CAP	
-----------------	--

Appendix D

Geologic Cross Section

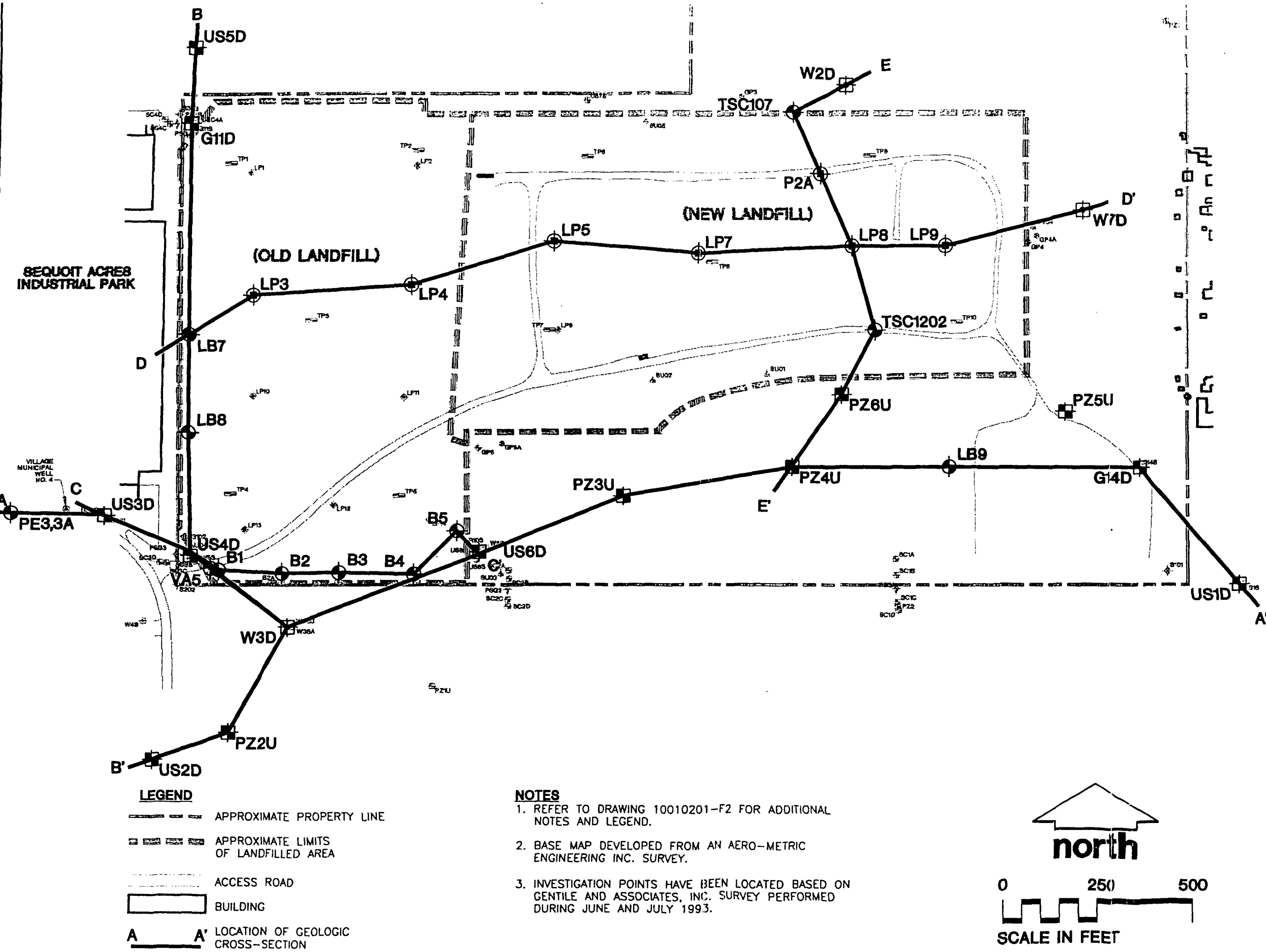


FIGURE 11

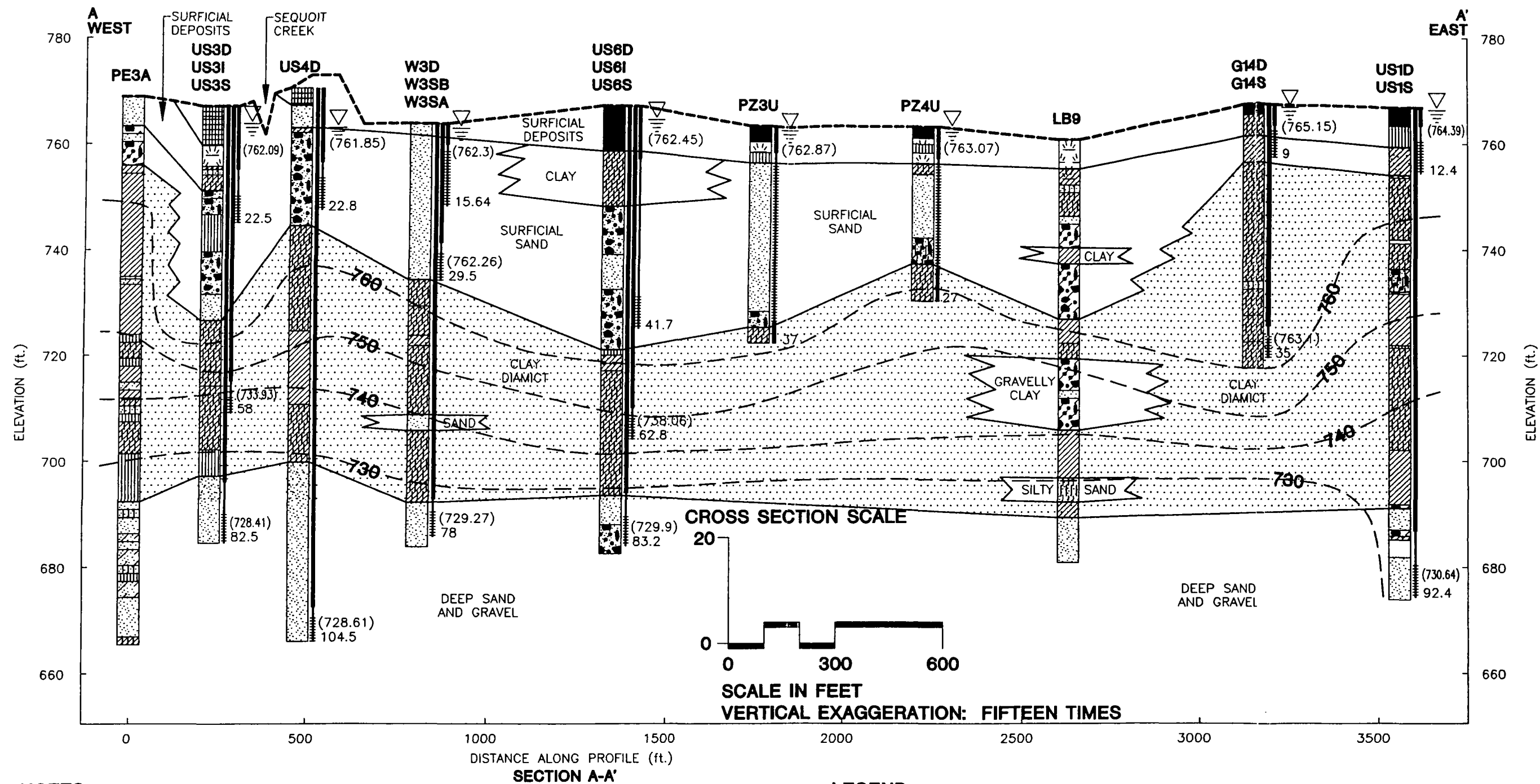
This document has been developed for a specific application and may not be used without the written approval of Montgomery Watson.

QUALITY CONTROL

Graphic Standards
Lead Professional

Technical Review
Project Manager

Management Review
Other



GEOLOGIC CROSS-SECTION A-A'

REMEDIAL INVESTIGATION
H.O.D. LANDFILL
WASTE MANAGEMENT OF ILLINOIS, INC.
ANTIOCH, ILLINOIS

Drawing Number
2386.009B22

MONTGOMERY
WATSON



Developed By PMS
Approved By *[Signature]*
Reference
Revisions

Drawn By CCM
Date 1-12-97

Appendix E

Static Leachate Volume



PROJECT / PROPOSAL NAME / LOCATION: <u>H.O.D. LANDFILL, REMEDIAL DESIGN</u>		PROJECT / PROPOSAL NO. <u>5314.08</u>
SUBJECT: <u>LEACHATE VOLUME CALCULATION</u>		
PREPARED BY: <u>JAMES TINSUM</u>	DATE: <u>2/22/2000</u>	FINAL <input type="checkbox"/>
CHECKED BY: <u>J. Doherty</u> <u>M/T 2/22/2000</u>	DATE: <u>2/22/00</u>	REVISION <input type="checkbox"/>

OBJECTIVE

ESTIMATE THE CURRENT VOLUME OF EXTRACTABLE LEACHATE IN H.O.D. LANDFILL BASED ON LEACHATE LEVELS MEASURED DURING THE NOVEMBER, 1999, ENGINEERING PREDESIGN INVESTIGATION AND A LEACHATE MAINTENANCE LEVEL OF EL 761.

BACKGROUND

AS PART OF THE USEPA APPROVED WORKPLAN FOR THE REMEDIAL DESIGN AT THE H.O.D. LANDFILL SITE, AN ESTIMATE OF THE VOLUME OF EXTRACTABLE LEACHATE WAS TO BE PREPARED. THIS CALCULATION SET IS INTENDED TO SATISFY THIS REQUIREMENT.

APPROACH

- 1) USE LEACHATE LEVELS OBTAINED DURING THE NOVEMBER 08 AND 09, 1999, ENGINEERING PREDESIGN INVESTIGATION (PDI) AS THE TOP SURFACE FOR A VOLUME CALCULATION.
- 2) USE A LEACHATE MAINTENANCE ELEVATION OF 761 AS THE BASE SURFACE FOR A VOLUME CALCULATION.
- 3) PREPARE A TRIANGULATED VOLUME REPORT OVER THE LANDFILL FOOTPRINT.
- 4) ESTIMATE THE SPECIFIC YIELD OF THE LANDFILL MATERIAL.
- 5) CALCULATE VOLUME OF EXTRACTABLE LEACHATE BASED ON THE TRIANGULATED VOLUME (STEP 3) AND THE REPRESENTATIVE SPECIFIC YIELD (STEP 4).

ASSUMPTIONS

- 1) THE RATIO OF WASTE TO DAILY COVER AT THE SITE IS 6:1 (BASED ON INDUSTRY STANDARD, RMT'S EXPERIENCE).
- 2) CALCULATION IS FOR STATIC CONDITION ONLY (I.E., NO INFLOW/OUTFLOW OF LEACHATE).
- 3) ESTIMATED SPECIFIC YIELD: FOR THE WASTE, USE A SPECIFIC YIELD OF 10% (OWE'S ET. AL, 1990) AS A REASONABLE VALUE FOR THE SHORT-TERM. IT IS IMPORTANT TO NOTE THAT AN EXACT ESTIMATE OF RECOVERABLE LEACHATE VOLUME IS DIFFICULT TO



PROJECT / PROPOSAL NAME / LOCATION: <u>H.O.D. LANDFILL, RD</u>		PROJECT / PROPOSAL NO. <u>5314.08</u>
SUBJECT: <u>LEACHATE VOLUME CALCULATION</u>		
PREPARED BY: <u>JAMES TINJUM</u>	DATE: <u>2/22/2000</u>	FINAL <input type="checkbox"/>
CHECKED BY: <u>John L. MAT</u>	DATE: <u>2/22/00</u>	REVISION <input type="checkbox"/>

TO CALCULATE THE YIELD IS A FUNCTION OF COMPACTION, AGE, TEMPERATURE, COMPOSITION, AND SATURATION OF THE WASTE AS WELL AS LANDFILL GAS CONTENT. AT H.O.D. LANDFILL, THE WASTE IS A MINIMUM OF 15 YEARS OLD, A PORTION OF THE WASTE WAS BURNED AND A SIGNIFICANT AMOUNT OF CONSOLIDATION HAS ALREADY OCCURRED. BASED ON THESE CONDITIONS, A LOW SPECIFIC YIELD IS EXPECTED.

- 4) DAILY COVER DOES NOT CONTAIN RECOVERABLE LIQUID.
- 5) PERCHED LIQUID IS NOT IMMEDIATELY RECOVERABLE.

ANALYSIS

- 1) ATTACHMENT 1 SHOWS THE TOTAL VOLUME OF SATURATED WASTE MASS AT H.O.D. LANDFILL TO BE:

$$VOLUME_{TOTAL SAT. MASS} = 940,431 \text{ CY} \checkmark$$

- 2) ACCOUNT FOR WASTE/COVER RATIO

$$V_{WASTE} = 940,431 \text{ CY} \times \frac{27 \text{ CF}}{\text{CY}} \times \frac{6}{7} = 21,764,260 \text{ CF} \checkmark$$

$$V_{COVER} = 940,431 \text{ CY} \times \frac{27 \text{ CF}}{\text{CY}} \times \frac{1}{7} = 3,627,377 \text{ CF} \checkmark$$

- 3) CALCULATE VOLUME OF EXTRACTABLE LEACHATE

$$V_{EXTRACTABLE LEACHATE} = V_{WASTE MASS} \times YIELD = 21,764,260 \text{ CF} \times 0.10 = 2,176,426 \text{ CF} \checkmark$$

- 4) CONVERT TO GALLONS

$$2,176,426 \text{ CF} \times \frac{7.48 \text{ GAL}}{1 \text{ CF}} \times \frac{1 \text{ MG}}{10^6 \text{ GAL}} = \underline{16.3 \text{ MG}} \checkmark$$

CONCLUSIONS

- 1) AN EXTRACTABLE VOLUME OF 16.3 MG OF LEACHATE IS REQUIRED TO LOWER LEACHATE LEVELS TO A MAINTENANCE ELEVATION OF 761.
- 2) TO MAINTAIN THIS LEVEL, CONTINUED EXTRACTION WOULD BE REQUIRED TO ACCOUNT FOR INFILTRATION, INFLOW FROM SURROUNDING AQUIFER, RECOVERY OF PERCHED LEACHATE, AND CONTINUED WASTE CONSOLIDATION.



744 Heartland Trail
Madison, WI 53717-1934
Tel. (608) 831-4444 • Fax (608) 831-3334

SHEET 3 OF 3

PROJECT / PROPOSAL NAME / LOCATION: <u>H.O.D. LANDFILL, RD</u>		PROJECT / PROPOSAL NO. <u>53/4.08</u>
SUBJECT: <u>LEACHATE VOLUME CALCULATION</u>		
PREPARED BY: <u>JAMES TINJUM</u>	DATE: <u>2/22/2000</u>	FINAL <input type="checkbox"/>
CHECKED BY: <u>JMT</u>	DATE: <u>2/22/00</u>	REVISION <input type="checkbox"/>

REFERENCES

OWEIS, I.S. ET. AL (1990). HYDRAULIC CHARACTERISTICS OF MUNICIPAL REFUSE. J. OF GEOTECHNICAL ENGINEERING, VOL. 116 (4), APRIL, 1990.

RMT, INC. (2000). PREDESIGN INVESTIGATION RESULTS, LANDFILL GAS AND LEACHATE, FEBRUARY, 2000.



COMPUTATION SHEET

SHEET 1 OF 1
 744 Heartland Trail (53717-8923) P. O. Box 8923 (53708-8923) Madison, WI (608) 831-4444 FAX: (608) 831-3334 VOICE: (608) 831-1989

PROJECT/PROPOSAL NAME	PREPARED		CHECKED		PROJECT/PROPOSAL NO.
H.O.D. LANDFILL	By: LLS	Date: 1-10-00	By: RBN	Date: 1/26/00	5314.04

MPT 2/22/00

STATIC VOLUME OF LEACHATE

Purpose:

To determine the volume of saturated waste and soil between the top of leachate levels to an elevation of 761 MSL.

Methodology:

After the leachate grades and wellbase grades are developed, *Intergraph's design software "Siteworks"* was utilized to generate and compare a digital terrain models (3-dimensional surface model) of each. These two surfaces, leachate and wellbase, were compared by the triangle method using *"Siteworks"* to determine the site capacity (volume) within the limits of waste.

Design File: j:\05314\04\leachate.dgn

Original Surface: j:\05314\04\dtm\leachate.dtm

Design Surface: j:\05314\04\dtm\wellbase.dtm

Calculations:

- ☐ Grid Volume: ' Interval
☐ Selected Shapes: Level
☒ Triangle Volume

Original Surface: measured leachate volume within the limits of waste

Design Surface: assumed bottom of wells @ elevation 761.0'

Cut (cu yd)	Fill (cu yd)	Net (cu yd)
949,258.14	8,827.48	940,430.65 ✓

Results:

Static volume of leachate is ~940,431 cu yd.